Single Copies 10¢
Subscription rate $3.50 per yr. in U.S.A. and Mexico (U.S. money)
$4 in Canada
$5 in foreign countries
Trade Mark reg. U.S. Pat. Off.
Members of Audit Bureau of Circulations and Associated Business Papers, Inc

NATIONAL PETROLEUM NEWS

Branch Offices:
LOS ANGELES
Petroleum Securities Building
TULSA.
World Building
NEW YORK
342 Madison Avenue
HOUSTON
612 West Building
CHICAGO
35 Wacker Drive

Published by the National Petroleum Publishing Co. MAIN OFFICE · 1213 W. 3rd St., Cleveland, Ohio. Copyrighted 1928

Vol. XX Cleveland, Ohio, February 22, 1928 No. 8

Research is Key to Many New Markets For Petroleum Products

By H. W. Camp*

Presented before Petroleum Division, A. I. M. E., New York, Feb. 20-23

RESEARCH is defined, scientifically, as a "systematic investigation of some phenomenon, and also a search for hidden treasures." Chemists tell us that the hidden treasures of petroleum are far richer than the products which have been best known to us. However, these secrets will be discovered only through intensive and systematic, as well as scientific, industrial research. Indeed, the scope of the subject is so great that such an intensive research program should be assumed by a centralized organization supported by the petroleum industry as a whole. Such organization would assume the responsibilities for investigation of new products and development of markets for such products.

Gasoline, the chief product of the petroleum industry, has become a cheap commodity. The continual, uncontrolled over-production of crude petroleum, the intensive competitive condition in the marketing of petroleum products and the increase of refining efficiency and installing of cracking facilities, have all combined to lower the market value of gasoline. The lower cost of gasoline has all been passed on to the purchaser in the form of lower prices, so that today the most important product can scarcely be manufactured at a profit.

In other fields, manufacturing industries have diversified their products when faced by a similar situation. Thus they have been able to widen their marketing outlook. Why cannot the petroleum industry employ the same tactics?

Right now we are hearing much discussion concerning the development of a wider market for existing petroleum products and new products for existing or prospective markets. For

*General superintendent of refineries, Empire companies, Tulsa.

Latest Crude Revisions

A FULL report of crude oil price changes made on Feb. 21 by Carter Oil Co., Prairie Oil & Gas Co., and the Humble Oil & Refining Co. will be found in this issue on page 22. The report also gives the new price schedules.

The prices published in the market section of this issue are those in effect prior to the Feb. 21 changes.

Real Selling a Good Team Mate for Research

THE accompanying paper by Mr. Camp was prepared to deliver at the meeting of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers in New York, Feb. 22 and 23.

NATIONAL PETROLEUM NEWS deemed the picture it presents of the possibilities for more intensive development of markets for petroleum products so worthy of earnest consideration by every oil man that it is republished in this leading position in this issue.

Research now is undoubtedly the most important key to many new markets for existing oil products and for new ones science will bring forth.

Along with that research work, even now, and to an increasing degree as it is carried on in the future, must go good, intelligent survey and development of new markets, for even existing products today—in other words, *selling* as the business world generally defines it.

The oil sales companies large and small particularly, but every man in the business for that matter, must become market conscious. They must recognize as the first need of the industry—as have other lines of business—the developing of sound markets, both for existing products today and markets for new products. Research, backed by an industry thus minded, will indeed lead to a stabilization of the oil industry.

instance, we can cite recent developments for use of propane, butane and ethylene. Butane has been found to be an efficient and inexpensive refrigerant, especially adapted to home refrigerating systems. Propane and butane fractions of natural gasoline may be shipped under pressure and may be used as a substitute for acetylene in cutting torches in connection with oxygen. There is a possibility of substituting butane for gas oil in the carburetion of coal gas, as we know that butane contains practically the gas enrichment as the same volume of gas oil and should prove to be a superior product for this function. Ethylene, a hydrocarbon present in cracked gases, is finding an outlet for the artificial ripening of green fruits.

Accompanying is a table showing the more general uses of petroleum products as now established (see Table No. 1).

Petroleum, with its higher hydrogen content and mobile character, is an ideal raw material for the manufacturer of synthetic organic compounds, which can be produced economically, the extent of which cannot even be predicted. However, we do know that many valuable organic compounds, now chemical curiosities, will be available in quantities as by-products of petroleum. See Table No. 2.

The synthetic chemical industry based on petroleum as a raw material is now in its infancy. However, this field has possibilities of equaling or even surpassing the industry built up around coal tar both in magnitude and variety of products. The vast majority of the petroleum derivatives are non-benzenoid hydrocarbons and, as such, would not compete with coal tar derivatives. The present production of synthetic organic chemicals, especially the alcohols, glycols, aldehydes and their derivatives, is now being consumed by industrial markets, particularly in the lacquer, bakelite, automobile and explosive industries. Their uses are definitely established and the demand in these fields is increasing daily.

H. W. CAMP

At the present time there is an annual consumption of approximately $900,000,000 worth of chemicals, a large part of which are organic chemicals capable of synthesis from petroleum. The extent to which synthetic petroleum products can break into that market depends upon the ability of the petroleum industry to manufacture a product of superior quality, or better the prices of the same quality product as produced by present (other) processes. For example, the manufacturer of synthetic isopropyl alcohol must make a purer alcohol or must meet the price of isopropyl alcohol derived from acetone, a fermentation product. In case the manufacturer of the synthetic product can lower the price of isopropyl alcohol and still show a profit, the isopropyl alcohol derived from acetone will no longer be a factor in the market.

There are many other markets which will furnish large outlets for petroleum derivatives when they become available in quantity. The nature and extent of these markets are purely speculative in the light of our present knowledge. Many of them would probably have to be developed as the synthetic chemical industry expanded. They would have the advantage, however, of being relatively free from competition.

The hidden treasures of petroleum, the extent and richness of which I have attempted to sketch for you, can be uncovered by research. If we survey other major industries, such as cement, gas, electric, leather and steel, we find they maintain co-operative research organizations. These research laboratories have developed new products, introduced untold economies, led the way to scientific marketing, and saved millions of dollars for their respective industries.

IN THE past two or three years the petroleum industry has watched with interest the progress of the research program instituted by the Natural Gasoline Association of America. This program is supported by funds assessed from the members of the association and the information so obtained is imparted to all members. Much credit should be given this association for their courage and foresight in pioneering a co-operative research program of this nature. The American Gas Association has been maintaining a similar program for the natural gas industry.

The step that the natural gas and natural gasoline branches have taken in establishing co-operative research programs for the development of new products and enlargement of present markets is applicable to the entire petroleum industry. A centralized research program supported by the petroleum industry as a whole would economize on funds and personnel, minimize duplication of work, coordinate discoveries, and the benefits accruing from such a program would be greater than any results obtained by independent research by the various divisions of the industry. The different branches of the petroleum industry are interdependent and the general prosperity of one is conditional upon the prosperity of the others. Due to this interdependency, the scope of the problem and the fact the petroleum industry is dealing with essentially the same class of chemical

Hydrocarbon Gases

1. Fuel
2. Natural gasoline
   a. Blending with refining gasoline.
   b. Motor fuel
   c. Aviation fuel
3. Carbon black
   a. Paint
   b. Ink
   c. Rubber tires
4. Liquefied gases
   a. Coal gas enrichment
   b. Refrigeration
   c. Chemical synthesis

Light Distillates

1. Gasolines
   a. Motor fuels
   b. General solvents (Commercial solvents)
2. Naphthas
   a. Dry cleaning
   b. Paints
   c. Soap manufacture
3. Kerosene
   a. Tractor fuel
   b. Heating
   c. Illumination

Intermediate Distillates

1. Gas oil
   a. Diesel fuel
   b. Cracking stock
   c. Coal gas enrichment
2. Absorption oil
   a. Gasoline recovery
   b. Benzol recovery

Heavy Distillates

1. Lubricating oils
   a. Internal combustion engines
   b. Industrial uses
2. Technical oils
   a. Flotation
   b. Medicinal
   c. Emulsifying
3. Waxes
   a. Candles
   b. Waterproofing
   c. Sealing

Residual Oils

1. Cylinder stocks
   a. Bright stocks
   b. Steam cylinder oils
   c. Grease compounding
2. Fuel oil
   a. Boiler fuel
   b. Furnace
   c. Gas manufacture
3. Greases
   a. Heavy lubrication
4. Asphalt
   a. Paving
   b. Roofing
   c. Paints
5. Coke
   a. Fuel
   b. Carbon products
   c. Graphite

Sludge Products

1. Acids
   a. Source of valuable chemicals

material, it is vital that the entire industry unite in a co-operative research program.

The oil industry is faced with the necessity of immediately developing new outlets for its products. However, our store of fundamental data concerning the chemical and physical properties of the compounds which constitute petroleum is relatively meager. Hence it would seem that the centralized research program should be divided into two lines of endeavor:

(1) The immediate development of the more obvious possibilities for the wider utilization of petroleum products.

(2) Extensive research into the basic chemical and physical properties of the hydrocarbon series composing petroleum.

The data gathered here would be the basis for further expansion in the development of synthetic petroleum products.

Let us draw for your imagination, a picture of an average American home a few years from now when petroleum synthesis has been developed so as to produce the various products which are within the bounds of possibility. The interior decoration of the house is pyroxylin lacquer.

The house is furnished, of course, with bakelite furniture which is extremely popular and is painted and decorated with pyroxalin lacquer.

The heating system is operated with residual gas and furnace oil distillate burner, and refrigeration is effected by the use of methyl chloride. The linoleum, shingles, leather upholstering, bathroom fixtures, are all products of petroleum.

In the medicine chest we find camphor, turpentine, disinfectant, alcohol, vaseline, ointments and salves, purgatives, liniments and other items derived from petroleum. Milady laves her hands with soap, perfumes her bath and person with delicate perfumes, puts on her make-up, dresses in artificial silk and the unromantic and evil smelling crude oil has, through the ingenuity of man, furnished all these necessary aids to femininity.

A typical breakfast might consist of eggs cooked in lard substitute, toast spread with synthetic dairy butter, and coffee sweetened with petroleum derived saccharin.

MILADY drives the car out to do her shopping, the car operating on knockless motor fuel, entirely different from our present fuel, and riding on tires developed from petroleum. The lacquer on the car, the leather upholstering, floor covering, instrument board, horn button and other fixtures are petroleum derived. Detouring a few blocks where workmen are blasting with explosives, originally petroleum, she stops and buys a package of her favorite hydrocarbon chewing gum.

These are a few of the vast number of possibilities in the application of petroleum and its allied gases. No doubt the field has only been scratched and organized and exhaustive research will surely develop many other products now unknown to anyone.

In subscribing to a program for petroleum research it must be borne in mind that Rome was not built in a day and, in investing in a co-operative enterprise of this nature, we cannot reasonably expect to immediately revolutionize the petroleum industry. We could, however, expect to find the dividends from this investment would be cumulative and would compound with the passage of time. The day may arrive when gasoline will be only a by-product of petroleum, when considered from the point of view of net profits.

Classes of Organic Compounds Capable of Synthesis from Petroleum, Examples and Uses

(Table 2)

Alkyl Chlorides—

Methyl chloride, ethyl chloride, carbon tetrachloride, chloroform and others. Chiefly used as refrigerants, solvents, anesthetics, and as a base for further chemical synthesis.

Alcohols—

Methyl, ethyl, propyl, butyl, amyl, higher alcohols and other alcohols, such as the glycols. Chiefly used as general solvents and for the rayon silk and pyroxylin lacquer industries.

Aldehydes—

Formaldehyde, acetaldehyde, etc. Chiefly used in manufacture of synthetic resins, (bakelite), antiseptics, denaturants and as a base for synthesis.

Esters—

Propyl acetate, amyl acetate, butyl acetate. Chiefly used as a base for pyroxylin lacquers and chemical synthesis.

Fatty Acids—

Formic, etc. Undeveloped at present time but edible fats, butter and lard substitutes, and soaps are possible from petroleum synthesis.

Ketones—

Acetone, methyethyl ketone, etc. Chiefly used for solvents and as a base for chemical synthesis.

Aromatics—

Benzol, toluol, etc. Dyestuffs, saccharin, explosives, antiseptics, perfumes, artificial leather, etc., can be synthesized from petroleum in competition with coal tar industry.

AMARILLO, Tex., Feb. 17.—Garcia Grinto, representative of the Argentine government, who is on a lengthy inspection tour of the oil fields of the United States, has visited the Panhandle as the guest of the National Supply Companies and John Le Bosquet, Panhandle scout for the Sinclair Oil and Gas Co.

Mr. Grinto, who is studying methods in this country for his government, has been giving particular attention to the rotary drilling equipment and to the advances being taken by the natural gas industry.

Scouts to Decide 1928 Meeting Place

HOUSTON, Feb. 17.—Ford Turner of the Pure Oil Co., San Antonio, has called a meeting of the executive committee of the National Oil Scouts of America, at Dallas, Feb. 25, to decide on the time and place for the 1928 convention.

Members of the executive committee are G. W. Arnold, Pure Oil Co., Houston; P. G. Booth, Humble Oil & Refining Co., Breckenridge; C. J. Bradley, The Texas Co., Colorado City, Texas; Joe Clingen, Roxana Petroleum Corp., Abilene; R. O. Frame, Humble Oil & Refining Co., Wichita Falls; Ed L. Hogan, Prairie Oil & Gas Co., Corsicana; J. F. Hornbeck, Vacuum Oil Co., Midland; J. B. Leonard, Prairie Oil & Gas Co., Eastland; C. B. McCormack, Roxana Petroleum Corp., Dallas; E. G. Morehead, Simms Oil Co., Shreveport, La.; G. R. Nicholson, Empire Oil & Gas Co., Amarillo; G. C. Phillips, Marland Oil Co. of Texas, San Angelo; and O. E. Reynaud, The Texas Co., El Dorado, Ark.

CASPER, Wyo.—Midwest Refining Co. is building its fifth casinghead gasoline plant in the Salt Creek field. This plant will process gas that is now being wasted.

A.O.M.A. Will Talk Profits for 1928

CHICAGO, Feb. 19.—Everyone who addresses the American Oil Men's Association convention here March 6, 7 and 8, will talk on the same subject. The topic is one which James A. Gilmore, secretary, considers the year's most absorbing one, that is, "Profits for 1928".

Two or more jobbers will talk on the subject. At least two refiners will be heard from, then there will be others who will talk on specific methods of improving earnings through complete lubrication service, through greasing establishments, through car washing, and-so-forth.

The names of all the speakers are not ready to be announced as some have given a tentative promise to be on the program. The one qualification for every speaker is that he must know his subject. "If he made profits in 1927 he is capable of discussing the subject of 'Profits in 1928'", Mr. Gilmore said.

B. H. Anglin, vice-president of Indian Refining Co. of Lawrenceville, Ill., is one of the refiners. Another refiner will be on the program also, but his name is withheld because he has not been able to make his promise definite yet.

A. S. Close, vice-president and general manager of Hickok Producing Co., Toledo, O., is on the program. He is head of one of the few oil jobbing companies in the United States that can boast of never having cut a price to get business, not even meeting the Quantity Discount Agreement at its Michigan stations. Another oil marketer on the program who sells his products without regard to his competitors' prices is R. S. Williams, head of the Williams Oil Co., Muncie, Ind. Mr. Williams is president of the Indiana Independent Petroleum Marketers Association.

G. W. Benedict and L. F. Marshall, joint authors of a book on the subject of making profits by operating complete lubrication stations, are both on the program. They are both with the Weaver Manufacturing Co. of Springfield, Ill.

J. P. Nicholson, head of the Klean-Rite Auto Laundry Co., will talk about making money through car washing; how the job adapts itself to the oil marketing business.

An unusual feature of the program is that every exhibitor will be given three minutes to talk to the assembled oil men. The equipment manufacturers' subject will be "Profits for 1928".

The last innovation of the convention is in arrangements for the annual banquet. There will be no dance but a movie, and a few good acts of musical entertainment. The moving picture is "The Story of Petroleum", the American Petroleum Institute's film. It is in four reels and lasts an hour and a half. The time will be broken by other entertainment features.

The main idea with the banquet program is that it be short and permit the oil men to seek entertainment of their own liking. There will be no long-winded speaker. There will, however, be good music and maybe a dancing act or two.

Will Address Refiners On Joint Research

TULSA, Feb. 20.—"Some of the Accomplishments of Co-operative Research", will be described to members of the Western Petroleum Refiners Association at the annual convention to be held at Kansas City on March 6. Dr. Frank C. Whitmore, chairman of the Division of Chemistry and Chemical Technology of the National Research Council and head of the chemistry department of Northwestern University will address the refiners on this subject.

In the current bulletin of the Western Petroleum Refiners Association Howard Bennette, managing director, issues an invitation to every member company to be represented by someone interested in the technical phases of refining in addition to the usual executive representation.

3 Marland Companies Are Consolidated

TULSA, Feb. 18.—E. W. Marland, president of the Marland Oil Co., returned to his Ponca City headquarters the past week and issued a statement on the consolidation of three subsidiary companies. These are the Marland Oil companies of Oklahoma, Colorado and Texas. They have been reformed under the name Marland Production Co.

At the same time Mr. Marland announced that two vice-presidents of the parent company and the treasurer would not be candidates for re-election at the annual meeting in May. The three are John S. Alcorn, J. K. Cleary, vice-presidents and Seward R. Sheldon, treasurer. All have been with the company for several years. They will organize a company of their own and will maintain headquarters in Ponca City.

Mr. Marland will be president of the new Marland Production Co. and C. C. Brown will be executive vice-president. Mr. Brown has been a director of the parent company for several years. Other vice-presidents of the new company are A. W. McCoy and Travis L. Golay, of the Colorado company; W. A. Moncrief and I. G. Harmon, of the Texas company; J. R. McGinley, G. C. Shallenberger and R. T. Clark, of the Oklahoma company.

N. Dakota Jobbers Annual Meeting

FARGO, N. D., Feb. 18.—The largest group of Independent oil jobbers ever assembled in North Dakota attended the annual meeting at the Waldorf hotel in Fargo on Feb. 2 and 3. There were 110 registrations. George F. Shafer, attorney general of North Dakota, was the first speaker. He discussed "Government and Business."

The second speaker was C. C. Wagner of the Dacotah Oil Co., Madison, S. D., who discussed "Deterioration of Crank Case Oil." Mr. Wagner's talk has been heard by oil men in other states who have prevailed on him to tell them what he has learned about automotive lubrication.

N. E. Williams of the Fargo Commercial club addressed the convention on the second day on "Freight Rates." A representative of the Canfield Oil Co. of Cleveland, O., had charge of the last event on the program, showing the moving picture called "Manufacture of Lubricating Oils." It was at this meeting that G. C. Anderson of McLaughlin, Noreen & Co., Minneapolis first delivered his talk on "Profits" which he was persuaded to take to three other state meetings.

Most of the officers of the North Dakota Petroleum Association were re-elected for 1928. Among them was the president H. M. Wilson, International Oil Co. of Minot. The officers for the coming year are:

President, H. M. Wilson, International Oil Co., Minot; vice-president, K. H. Helgerund, Helgerund Oil Co., Harvey; secretary, Paul Hadlick, Minneapolis; treasurer, H. A. Schmidtt, Red Trail Oil & Transfer Co., Mandan.

Two directors to serve for a term of three years are Arnold I. Berg of the A. G. Sorlie Oil Co., Grand Forks, who succeeded himself, and A. O. Foster of Oakes, N. D.

Loses Suit For Imperial Receivership

TULSA, Feb. 20.—The application of C. L. Mayhall for a receivership for the Imperial Refining Co. and allied companies was denied on Feb. 16, by Judge Edwin I. McNeill of the District Court of Tulsa County at the conclusion of a hearing. Mr. Mayhall formerly was a vice president of the Imperial and is a minority stockholder. He alleged that the value of his stock was depreciated by acts of the management.

TOLEDO, Feb. 17.—A. S. Close, vice-president of the Hickok Producing Co. and president of the American Oil Men's Association, returned this week from a tour of Mid-Continent producing and refining areas.

50,000 Barrels of California Heavy Oil May be Shut In, as Conservation

By W. E. Green
N. P. N. STAFF WRITER

LOS ANGELES, Feb. 18 DECISION has been reached by officials of the leading oil companies of California to shut in as much oil as possible, as soon as details can be worked out. Decision on a number of these points will be reached early next week at an informal conference to be attended by those with the most at stake. Due to the fact that the movement is just under way, with many details yet to be decided, none of its leaders will discuss the matter at present.

It is known that between 30,000 and 50,000 barrels of daily average production of heavy oil will be closed in, probably by March 1. It has also been decided that the production of refinable oil at Ventura Avenue will be reduced approximately 20 per cent —between 10,000 and 12,000 barrels. It is likely that close to 10,000 barrels of refinable oil will be closed in in Orange County. There also is a possibility that attempts will be made to reduce production at Dominguez, as this field is controlled by only two companies. Standard almost completely controls West Coyote, and it is possible that some production will be shut in in that field also.

The shut-in movement had its inception two weeks ago, but the wheels did not begin to turn with much momentum until this week. This week a number of important conferences have been held and much work has been done by sub-committees, composed of engineers and field, working up information for use at the general conferences.

Those behind the movement to shut in some wells at Ventura Avenue feel that the field is to be benefited by the movement. At least 60,000,000 cubic feet of gas has been lost in this field, and this gas is valued at about $6,000 a day. With the shut-in program worked out, this gas will be saved and at least 10,000 barrels of production held back. Also it is understood that the plans will call for the production of any new well for 30 days only, and then it will be allowed to produce only 80 per cent of what it produced during the 30 day period.

The present daily average production of the Coyote field is about 13,500 barrels and, since much of this field is controlled by one company, probably most of the wells could be closed in. In Brea Canyon, the Shell Co. recently completed a well making 4,500 barrels, and it is thought the Shell and the Union will decide to shut in some of the present production in this area. The Union owns in fee the Stearns lease, 1,000 acres, and some of the wells on this lease could be closed in if necessary. Not much can be done at Seal Beach, Huntington Beach or Long Beach, as many small operators are involved, who are not in a position to close in their wells, or even reduce their flow.

The big accomplishment of the shut-in movement will be the reduction of heavy oil production, which is used almost entirely as fuel oil. Heavy oil, including all grades of fuel oils, has been going into storage the past three years in California. Total stocks of this class of products have increased to slightly more than 93,000,000 barrels, a figure which represents a burden to carry. Fuel oil is selling at prices which represent a loss to the major oil companies. The shutting in of say 50,000 barrels of additional heavy production will relieve this situation. The fields in Kern county will bear most of the burden, and the oil companies will be put to some expense to take care of the royalty owners. Just how this is to be handled is not fully decided upon except in a few instances.

A check this week of the present shut-in situation in California indicates that approximately 84,000 barrels of daily production is now shut in and has been held back for several months, and in some instances several years. If the present program goes as planned and 75,000 barrels of additional production is closed in, then the state will have a held back production of nearly 160,000 barrels.

Whether the California refineries will reduce their crude runs to stills is not known. Natural gasoline is plentiful at a comparatively low price. Most of the larger plants have cracking plants. The Shell Co. is now cracking fuel at the approximate rate of 12,000 to 15,000 barrels daily. Union Oil is cracking gas oil, and the Pan American is running cracking stills, it being reported that Pan American recently turned out its millionth barrel of cracked gasoline. Richfield and California Petroleum are in a position to crack gasoline. The Standard can crack when it wishes. The Associated could also produce cracked gasoline.

Steps now being taken to bring about the conservation of oil, or rather the holding back of the oil, are being taken with the full knowledge of state authorities, and with full approval. In fact many of the steps being taken are coming through a committee of oil men named at the request of the committee appointed by the state governor.

Index to Coming Meetings

Ohio Petroleum Marketers Association, Neil House, Columbus, O., Feb. 22, 23, 24.

Western Petroleum Refiners Association, Muehlbach Hotel, Kansas City, Mo., March 6.

American Oil Men's Association, Hotel Stevens, Chicago, March 6, 7 and 8.

Wisconsin Independent Oil Jobbers Association, Hotel Plankinton, Milwaukee, March 14.

Independent Oil Men's Association of New England, American House, Boston, Mass., March 14, 15.

Independent Oil Men of America, annual election, Stevens Hotel, Chicago, March 19, 20, 21.

American Association of Petroleum Geologists, business and technical sessions in San Francisco, March 21, 22, 23; field trips and entertainments, Los Angeles, March 24, 25.

American Oil Burner Association, Hotel Stevens, Chicago, April 3, 4, 5, 1928.

American Chemical Society, St. Louis, Mo., Apr. 16, 17, 18, 19.

National Petroleum Association, Cambridge Springs, Pa., April 19, 20.

Natural Gasoline Department of American Gas Association, Texas Fair Grounds, Dallas, May 7, 8, 9, 10.

Natural Gasoline Association of America, Hotel Mayo, Tulsa, May 22, 23, 24.

Mid-Continent Crudes Revised, Low Grades Cut, High Grades Up

BULLETIN

(By Telegraph)

CASPER, Wyo., Feb. 21.—Effective Feb. 21 Mid-West Refining Co. revised price of Salt Creek crude; 29-29.9 gravity was posted at $1.01 with a 5 cent differential to 32 gravity at $1.16. Beginning with 33 gravity at $1.19 there is a 3 cent differential through 37 and above at $1.31. This is a change ranging from a 13 cent reduction on heavy crude to a 1 cent advance on 37 and above gravity.

Staff Special—By Telegraph

TULSA, Feb. 20

OKLAHOMA, Kansas, north Texas, Texas Panhandle and north Louisiana crude oil prices were revised effective Feb. 21. Carter Oil Co. led the revision, followed by Prairie Oil & Gas Co., the Humble Oil & Refining Co. and The Texas Co.

Prairie's new schedule for Oklahoma, Kansas, and north Texas is a reduction of 16 cents on 28-28.9 gravity. A 5 cent differential was established on each succeeding gravity through 32 gravity. Beginning with 33-33.9 gravity there is a 3 cent differential, making an advance of from 1 to 16 cents on higher gravities. Crude 52 and above is now posted at $1.76. Under the old schedule the lowest grade posted was 28-28.9 at $1.12 with a 2 cent differential for each succeeding grade with 52 and above posted at $1.60.

Carter's revision begins with 24-24.9 gravity at 76 cents, with a 5 cent differential through 32 gravity and with a 3 cent differential upwards from 33-33.9 gravity through 52 and above. New schedules of both Carter and Prairie meet the old schedule at 36-36.9 gravity, at $1.28.

Humble Oil & Refining Co. made a similar revision on Texas Panhandle and on Wichita Falls, Ranger and east Texas. Panhandle crude in Wheeler county below 29 gravity now is posted at 60 cents with a 5 cent differential through 32 gravity and with a 3 cent differential beginning at 33-33.9 gravity; with 44 and above posted at $1.16. Hutchinson and Carson county crudes begin at below 31 gravity at 60 cents with a 5 cent differential through 32-32.9 and a 3 cent differential beginning at 33-33.9 gravity. The new schedule in Gray county begins at below 27 gravity at 60 cents with a 5 cent differential through 32-32.9, and a 3 cents spread beginning with 33 gravity; and 44 and above posted at $1.26. The last previous change by Humble in Panhandle was Aug. 23 when all grades were posted at 75 cents.

Crude in Ranger, north Texas, Mexia, Powell, Richland, Wortham, Currie, Lytton Springs, Moran and Nocon fields all in Texas was posted at 76 cents for below 25 gravity, with a 5 cent differential through 32-32.9 gravity and a 3 cent differential beginning at 33-33.9 gravity, with 44 and above posted at $1.52.

The Texas Co. effective Feb. 21 met the Carter schedule in north, north central and central Texas and in north Louisiana where it purchases on a gravity basis. Its schedule begins at 24-24.9 gravity at 76 cents and ends with 52 and above at $1.76.

Magnolia Petroleum Co. on Feb. 16 reduced heavy grades of Oklahoma, Kansas and Texas crude in amounts ranging from 13 to 30 cents, posting these prices: below 30, 75 cents; 30-30.9 gravity, 90 cents; and 31-31.9 gravity, $1.05. Crude of 32 degrees and above was unchanged on that date. On Feb. 21, it posted the same schedule as Prairie on oil above 32 gravity, leaving unchanged the lower grades which it had reduced on Feb. 16. Magnolia's price on 32-32.9 is $1.16, with 3 cents additional for each succeeding degree of gravity, up to maximum grade of 52 and above, which is $1.76.

The Magnolia also met Humble's postings in the Texas Panhandle on Feb. 21.

The last previous change by Prairie Oil & Gas was March 12, 1927; by Carter Oil on March 14.

Pres. R. M. Young, of the Carter, told NATIONAL PETROLEUM NEWS that the change was an effort to readjust prices to conform more nearly with the realization value of refined products. The change has been under consideration for some time he said and the effort has been made to bring the prices of crude and refined into closer harmony.

W. S. Farish, president of Humble, on Feb. 21 issued a statement saying that the Humble is attempting to interpret in terms of crude values the present market value of fuel oil and gasoline. Continuing, he said that "in posting the new schedule for Panhandle crudes we have increased the posted price because we are no longer adding to storage crude in the Panhandle, nor are we shipping any of this crude by tank car."

The current crude readjustment comes almost one year after the effect of Seminole's production brought three consecutive crude reductions within 18 days. Carter Oil Co. also led the 1927 revision with a reduction effective Feb. 22, establishing a 4 cent differential. On March 5 Mid-Continent crude was reduced further, and a 3 cent differential established; and on March 12 a 2 cent differential was made effective.

Following are new schedules of Prairie Oil & Gas and the Humble Oil & Refining Co.:

> The date of the 13 to 30 cent reduction on Mid-Continent crude by the Magnolia Petroleum Co. is published incorrectly as Feb. 18 on page 118 of this issue. The date of this reduction was Feb. 16.

Prairie's New Schedule

Gravity	New Price	Old Price	Gravity	New Price	Old Price
28-28.9	$0.96	$1.12	40-40.9	1.40	1.36
29-29.9	1.01	1.14	41-41.9	1.43	1.38
30-30.9	1.06	1.16	42-42.9	1.46	1.43
31-31.9	1.11	1.18	43-43.9	1.49	1.42
32-32.9	1.16	1.20	44-44.9	1.52	1.44
33-33.9	1.19	1.22	45-45.9	1.55	1.46
34-34.9	1.22	1.24	46-46.9	1.58	1.48
35-35.9	1.25	1.26	47-47.9	1.61	1.50
36-36.9	1.28	1.28	48-48.9	1.64	1.52
37-37.9	1.31	1.30	49-49.9	1.67	1.54
38-38.9	1.34	1.32	50-50.9	1.70	1.56
39-39.9	1.37	1.34	51-51.9	1.73	1.58
			52 and above	1.76	1.60

Humble's New Schedule

Texas Panhandle

Wheeler County

Gravity	New Price
Below 29	$0.60
29-29.9	.65
30-30.9	.70
31-31.9	.75
32-32.9	.80
33-33.9	.83
34-34.9	.86
35-35.9	.89
36-36.9	.92
37-37.9	.95
38-38.9	.98
39-39.9	1.01
40-40.9	1.04
41-41.9	1.07
42-42.9	1.10
43-43.9	1.13
44 and above	1.15

Hutchinson and Carson Counties

Gravity	New Price
Below 31	$0.60
31-31.9	.65
32-32.9	.70
33-33.9	.73
34-34.9	.76
35-35.9	.79
36-36.9	.82
37-37.9	.85
38-38.9	.88
39-39.9	.91
40-40.9	.94
41-41.9	.97
42-42.9	1.00
43-43.9	1.03
44 and above	1.06

Gray County

Gravity	New Price
Below 27	$0.60
27-27.9	.65
28-28.9	.70
29-29.9	.75
30-30.9	.80
31-31.9	.85
32-32.9	.90
33-33.9	.93
34-34.9	.96
35-35.9	.99
36-36.9	1.02
37-37.9	1.05

Gravity	New Price	Gravity	New Price
38-38.9	1.08	39-39.9	1.11
40-40.9	1.14	41-41.9	1.17
42-42.9	1.20	43-43.9	1.23
44 and above	1.26		

Ranger, north Texas, Mexia, Powell, Richland, Wortham, Lytton Springs, Moran and Nocona fields, placed on this schedule:

Gravity	New Price	Gravity	New Price
Below 25	$0.76	35-35.9	1.25
25-25.9	.81	36-36.9	1.28
26-26.9	.86	37-37.9	1.31
27-27.9	.91	38-38.9	1.34
28-28.9	.96	39-39.9	1.37
29-29.9	1.01	40-40.9	1.40
30-30.9	1.06	41-41.9	1.43
31-31.9	1.11	42-42.9	1.46
32-32.9	1.16	43-43.9	1.49
33-33.9	1.19	44 and above	1.52
34-34.9	1.22		

Take "Waste From the Industry's Vocabulary"

By Warren C. Platt, Editor

AN IMPORTANT one of the oil industry's present problems is what the public thinks of it, for from that thinking—if it can be called such—will arise attacks and legislation on the industry. If the thinking is faulty the attacks and legislation will tend to be, or will actually be, unfair and unjust.

The public's thinking regarding the oil industry, yes, and even the thinking of part of the industry itself, has been warped by the constant use of the word "waste" in regard to various oil activities, particularly as to the production of oil.

The word "waste," if you look it up in the dictionary, has a wide meaning to say the least, but the public and also the average speaker or writer about the oil industry, uses it in its strongest meaning—to destroy, to devastate, to demolish unnecessarily and even wilfully, etc, etc. Even those who would be academic and refer to "economic waste" and thereby intend to mean loss to the public which can be avoided by more efficient methods, if **they can be devised**, are not getting over to the average man the distinction between this kind of "waste" and the "waste" the public is thinking of.

Words should be used in their popular sense. If the public thinks of a word as meaning a certain thing, that is the way it should be used in ordinary conversation and in contacts with the public and its representatives. It is futile to stand out for a different or finer understanding of a word. Language is constantly changing, and this change should now be recognized by the oil industry as regards that word "waste."

The oil industry now can most properly, and for its own protection and the ultimate public good, discontinue entirely the use of the word "waste" in all discussions of conservation and the oil industry.

When we use "waste" to describe less efficient methods, what picture do we paint for the average man in the street, even the average oil man who is away from the producing fields?

It is a picture of bringing the oil to the surface to utterly and wilfully destroy it to no good purpose whatever, to run it on the ground until the sun dries it up or it sinks into the soil.

That is what the general public sees when we talk of waste in oil methods.

We have known oil men in other branches of the industry who had this picture in regard to the production of oil. They were skeptical when told that present day methods will bring in enormous wells with hardly a drop of oil getting away, with hardly a drop of it on the derrick floor, and that what does escape is small compared with the total output and, so far as known good methods are concerned, is unavoidable; that the careless "waste" of oil in production probably isn't a circumstance to the waste of oil when the garage mechanic lubricates your car, or an oiler squirts oil on other bearings and gets a few drops or quite a bit of it on the floor or elsewhere where it can serve no purpose, a waste of oil which a little care in applying could easily avoid, and also the waste due to leaks in an engine.

When one thinks of all the oil that has been wasted in oiling all the millions of cars—probably a hundred million or more since the start of the automobile— in all of the many times a year each car is oiled, as well as the oil that leaks out, one can well believe that this needless waste must run into a pretty large quantity.

Yet the public doesn't think of that as waste, partly because the public is doing this wasting itself. It is human nature to blame every one but oneself for doing something foolish.

A dozen years or more ago, if the writer's memory is correct, the U. S. Bureau of Mines issued a bulletin or two on this real waste of oil and gasoline by the public, and strongly urged greater care and saving. But at no time in the present discussion of conservation has any government official or any one else dug up that report—which I am certain exists—and demanded legislation, or whatever, against it.

Practically every place where an oil man has reason for using this word "waste" in the sense that he means it, he could more properly speak of **less efficient methods.** That would truthfully describe what he is talking about.

In the report of the Committee of Nine, recently made public by the Federal Oil Conservation Board, and prepared by three able oil men, the same number of good oil lawyers and three others, the word "waste" has been used many times, in the sense of describing less efficient methods. This last phrase could much better have been used.

We do not want to appear reactionary, or to be talking against progress in oil industry methods. We believe the industry should push still harder for the most efficient in everything and that a wide field of effort is before it, but as we said at the beginning, a part of our problem is to insure the public having a proper understanding of what we are doing, and to accurately comprehend our efforts which are toward greater efficiency.

SO LET us use language which will give the true picture to the public of what we are doing and how well we are doing it.

In practically no other industry are the members of that industry using this word "waste" as applying to their own activities in the popular sense. Every industry is telling the public how more efficient it is every day, how it is successfully fighting to cut costs and give the public a better article.

Name an industry that is holding meetings around the country and talking loudly about "waste" within it? You can't do it.

"Waste," really, is only relative. What was a highly efficient method or machine, as today becomes yesterday, passes into the class of the less efficient and if, after every one has full knowledge of the lower efficiency of that method or machine and has had full opportunity to change to the more efficient; then the less efficient method, if one were to blindly persist in its use, could be called "waste," but only for that blind user of it.

There is not an industry or a business activity in the world that isn't more efficient today, in the light of present knowledge and there is not a business activity of any kind today that will not be more efficient tomorrow. Yet the public is not denouncing other industries for not being able to jump ten years into the future and do

(Continued on the next page)

Reduction of Arizona Gasoline Price Sought by Newspaper

By William E. Green
N. P. N. STAFF WRITER

PHOENIX, Arizona, Feb. 16

REDUCTION of the retail price of gasoline in Arizona, especially at Phoenix has been the object of a newspaper campaign conducted for the past three months by the Arizona Gazette. The total result early in February was a somewhat demoralized market at Phoenix, with no apparent accomplishment that will be lasting.

No action has been taken by the business men's organization of Phoenix or in the state. Gov. George W. P. Hunt was pressed hard for many days by the Gazette and he finally issued a statement.

All the wholesale oil companies take as a retail price basis the retail price of gasoline in Los Angeles (20.50 cents), add the additional state tax (1 cent) and the freight rate (5.28 cents), the governor said in his statement. Thus the retail price of 27 cents at Phoenix is determined. The freight rate on gasoline from north Texas refineries is about 1 cent higher than the rate from Los Angeles. Some north Texas gasoline is marketed in Phoenix and at other Arizona points.

The Arizona Gazette said that gasoline should retail at 22 to 23 cents at Phoenix, contending that gasoline can be purchased in Los Angeles at 7 cents. Some gasoline has been sold in Los Angeles at times at this price, but more has been sold at 8 to 9 cents than 7 cents. The newspaper writer then adds freight and state taxes, leaving 5.72 cents to pay cost of unloading car, loading into tank trucks, delivering to service stations over rough roads, and providing a profit for the service station or pump owner. No allowance is made for evaporation, and other losses.

THE newspaper campaign has as one of its objects, the forcing of the state of Arizona into the gasoline retail business, but the governor's statement early in January plainly stated that it was doubted if it was feasible for the state to engage in this business, calling attention to the necessity for a special session of the legislature to make possible such a venture. The governor also called attention to the large expenditures that would be necessary. The governor suggested that since municipalities and counties were in a position to enter business by passing an ordinance, these subdivisions could do so if it was the wish of the people. No such move has been instigated in Phoenix and no move of this character is expected.

A RESOLUTION has been offered in the senate by Senator Ashurst for an investigation of alleged violations of United States laws by California refineries alleged to have entered into an illegal combination to control the price of gasoline and oil in Arizona.

The Washington representative of NATIONAL PETROLEUM NEWS was informed at the Department of Justice, after the resolution was offered, that no one had informed the department of any such violation, and a clerk in Senator Ashurst's office said as far as he knew no one had "tipped off" the regular prosecuting officers of the government that there had been anti-trust law violations.

Take "Waste From the Industry's Vocabulary"

(*Continued from preceding page*)

today what time and development of knowledge and skill will undoubtedly do in the future.

To the average man the word electricity, probably is synonymous with efficiency. The electrical industry is generally, and rightly, considered a marvel of rapid development in efficient methods. The public has nothing but praise for it. Nowhere do you hear outcries against "waste" in the electrical business.

Yet, the writer was at a meeting of a certain line of business one day, when a group of men began seeing spots all over their business horizon, and under the leadership of some buyers who were interested in lower prices—in the thoughtless way of all of us when we are buying something—these men got to talking about the "waste" in their business. To hear them tell it it was simply terrible. To me it sounded quite like an oil meeting with a speech by some antagonistic outsider.

But, fortunately, the chairman happened to be with a big electrical company. He sat quietly during the discussion but, when the meeting came to a close, he took the crowd and turned them in the right direction by reminding them that they probably thought of the electrical industry as the last word in efficiency, a thought that he said was true but still that didn't mean that there was no economic waste, as some of the experts call it, in the operations of the industry.

"In fact," he said as he pointed to the incandescent lamps in the ceiling, "you probably think of those lamps as being most efficient. They are, but, nevertheless, they are only using some 5 per cent of the original energy of the coal and materials going to produce that light. As soon as the electrical industry can, and it is striving day and night and spending millions of dollars to that end, the industry will increase that efficiency rate to 6 per cent, then 7 per cent and so on, but whether it will take months or years no one knows. Just bear in mind that waste is only relative."

And so it is in the oil industry. We have conquered much "waste"; we are going to conquer much more.

But let us say that we are more efficient today than we were yesterday, and that tomorrow that efficiency will be still higher. Let us tell how we are spending millions of dollars and employing the most skilled minds we can find to study the problem of getting greater and greater efficiency. Let us demand that, if any one knows where another million dollars can be intelligently spent in the search, that person tell us and it will be spent promptly and gladly; that, if any one knows where there are brains that can more quickly battle toward the solution of our problems, let him wire or cable the names of the owners of those brains to the nearest oil company.

But in the meantime let us drop the word "waste" from our vocabulary, not only as regards producing of oil, but as regards refining it and marketing it to the ultimate consumer.

All down the line the oil industry is using the greatest degree of efficiency now known. But tomorrow we have every reason to believe the degree will be still greater.

Shaffer Eliminates Dealer Accounts That Do Not Bring Profit

Staff Special

SPRINGFIELD, Ill., Feb. 17

ONE big oil company has quit expanding its outlets. This news was released at the Illinois Petroleum Marketers Association's convention here on Feb. 16 and acknowledged with a storm of applause from the assembled oil men. B. L. "Barney" Majewski, vice-president and sales manager of Shaffer Oil & Refining Co., who was master of ceremonies at the meeting, mentioned it as a definite policy of his company.

"Until such a time as the motoring public needs more service stations than are available, we are not going to build any more," he said. "We have put out our last pump and tank to a dealer from which investment we can not figure a fair margin of net return."

"I am letting you in on some of our state secrets," Mr. Majewski continued. "We had a board meeting not long ago and the authorities of our company made some changes in our ways of doing business. It has been decided that Shaffer Oil & Refining Co. is not going to handle any more dealer business that does not net back the full refinery price. As a result we have actually cut off 12,000,000 gallons a year in 13 states.

"A vending pump costs $100 delivered to the customer's place of business and the tank with it costs $60—these are round figures and approximate the average. They have a four-year depreciation which costs $40 a year. Painting, maintainance and replacements of pumps and parts run up an annual cost of about $23 a year. Installation costs vary widely but we figure them at $25 a year per installation. Then the interest on the investment brings the company's cost per dealer outlet up around $100 a year.

"When a salesman goes out to sign up a garage customer, his potential gallonage is invariably overestimated. If the prospect shows the salesman any figures at all they are likely to be for his biggest month. When the dealer signs the contract it is supposed to bind him for five years, but in actual practice the average customer changes sources of supply every two years, and in big towns like Chicago you are lucky to keep them a year.

In the future, if our sales department wants to install new equipment or make improvements in any one's sales establishment to the extent of $200, it has to be O.K'd. by the board of directors. Moreover we have closed down 19 of our own filling stations for the winter because the business they returned did not justify their existence 12 months in the year."

Mr. Majewski delivered this talk after B. H. Anglin, vice-president of Indian Refining Co., Lawrenceville, Ill., had finished his address on "Volume and Expenses vs. Profits". He delivered it in more elaborated form before the American Petroleum Institute in Chicago last fall, and subsequently before groups of jobbers in Indiana, Michigan and Iowa. It was published in part in NATIONAL PETROLEUM NEWS of Feb. 1 on page 27.

"Mr. Anglin's talk before the institute was the direct cause of our change in policy," Mr. Majewski said. "Some of the officials of our company heard him and they started looking into the affairs of the sales department."

Standard Oil Co. of Indiana had a representative on the program of the Illinois convention, in Frank E. Packard, tax attorney. Mr. Packard was applauded vigorously after his candid discussion of the tax question which, he pointed out, is a problem of as much importance to one company as another.

"THE North American Association of Tax Administrators has been holding meetings annually for three years," Mr. Packard said, "and they are openly in favor of a tax on gasoline of 5 cents a gallon throughout the United States and Canada. So far, the motoring public and the oil industry have accepted gasoline tax laws with little or no opposition. That is the kind of a revenue measure any state administration likes to foster. And I predict that the next legislative year will bring the biggest flood of proposed gasoline tax legislation that has even been seen before.

"The oil industry is going to have to work together to defeat these bills. Standard Oil Co. has always permitted one-cent gasoline tax laws to pass without objection. The company has not paid much attention to 2-cent taxes except to try to get the bills framed in a way that permitted of easy enforcement if they were passed. But we have always opposed 3-cent taxes and we try to put up a real fight against 4-cent taxes.

"THE combined political influence of the Independents in any state is greater than that of the Standard Oil Co. Moreover, their combined taxes are greater than those of the Standard. The average oil man's taxes exceed his net earnings. I venture that by the time you are through paying taxes for 1927 they will aggregate more than the sum you add to your surplus. The industry's taxes in the United States in 1927 was between 300 and 350 millions of dollars.

"It is my opinion that the oil industry can not carry a general gasoline tax of 4 cents a gallon and prosper. Under conditions that bring about a low retail price structure, a 4-cent tax may be 20 or 25 per cent of the cost of gasoline to the consumer. It is my suggestion that all oil companies, large and small, whether they can agree on other matters of policy or not, work together on this matter of taxation. Our combined efforts are necessary and our interests in the matter are identical."

The registration was slightly in excess of 300, it was announced at the secretary's desk. The program of the second day consisted of R. B. White's address, "A Lubrication Catechism" which he delivered the previous week in Des Moines, before the Iowa jobbers, and a talk on accounting by Glenn C. Anderson of McLaughlin, Noreen & Co., Minneapolis. Mr. Anderson recently appeared before jobbers in South Dakota and Iowa on the same subject.

New Illinois Officials

President—E. R. Kennedy, Kennedy Oil Co., Galesburg.

Vice-president—Tom Kelly, Kelly Oil Co., Altona.

Secretary-treasurer — G. A. Primm.

Directors

Frank Muench, Diamond Kerosene Co., Carlinville, for one year to replace E. R. Kennedy who became president.

For three years—I. A. Archambault, Pennsylvania Oil Co. of Evanston; Russel Hanson, Solle Oil Co., Springfield; B. H. Taggart, Sweney Gasoline & Oil Co., Peoria, and B. L. Majewski, Shaffer Oil & Refining Co., Chicago.

Safety Work Cuts Number of Accidents As Air Lift Makes New Hazards

Staff Special

TULSA, Feb. 20

REMARKABLE progress in the prevention of accidents in the Mid-Continent was made in 1927. Annual reports now being completed by safety directors for the various companies show reductions in both the frequency of accidents and in their severity.

The progress in safe working is most clearly shown by companies that have been maintaining safety departments for several years. The cumulative work of these departments is beginning to bear fruit. One company, for example, has reduced its accidents approximately 70 per cent in the past five years.

During 1927 it is probable that better records might have been set up if it had not been for the air and gas lift activities of producing companies. Both in re-pressuring old properties and in the air and gas lift work as practised in the Seminole district, for example, the industry has discovered new hazards which it is working to minimize or remove.

Not long ago the employee of an oil company operating in the Seminole field was standing not far from an above-ground high pressure gas line connected with a well some 300 feet away. Suddenly the line was seen to turn a dull red and then in almost an instant it brightened through a cherry color to a white heat and burst into ribbons. The line was designed to carry a working pressure of 2,400 pounds per square inch. Assuming it had a safety factor 5 to 1 the internal pressure in the line must have exceeded 100,000 per square inch before it burst.

In one instance in Oklahoma a man was standing over a high pressure gas line when it blew up. He died within a few days of the accident.

The hazard which may result from carelessness in the operation of gas lift plants is being pointed out to operating employees in all fields by superintendents and safety engineers. Men are being shown that the pressures running up to 1,200 pounds per square inch in these lines exceed those carried on cracking plants at refineries where a constant check is maintained on all equipment subject to pressure to see that it has not been affected by corrosion or other factors which might cause failure.

High stage compressor cylinders are a source of danger under certain conditions. The heat of compression in these cylinders is great at all times and if an explosive mixture should be drawn into the cylinder a serious accident might result. There are instances of such explosions on record. To avoid drawing in an explosive mixture engineers are causing all intake lines to be conducted outside of compressor buildings. In addition it is good practice to have these intakes a considerable distance above the earth so that no gas accumulations hanging near the ground may be drawn in.

POSSIBLY the most frequent explosions at gas lift plants in the Seminole district have been in exhausts. The reason for these explosions is less clear than for some others. It is thought generally that the explosive mixtures are caused by the lubricating oil. Temperatures are quite high at exhaust valves and it is thought that possibly excess oil from the cylinder comes in contact with a cracking heat or that the oil is at least vaporized. To avoid these explosions engineers are using high flash point oils and using the oil sparingly.

One of the most frequent causes of high pressure line explosions, is said to be the result of improper changing from gas to air in the pressure system. When making a change oper-

1. Causes of explosions in compressors.

a. Excessive heating up of compressor from any cause.
b. Defective valves, leaks back from high to low stages causing air to churn in the compressor until it reaches the ignition temperature for the mixtures of air with oil vapors or gas present.
c. Improper lubrication.
   (a) Low flash ploint oils are dangerous.
   (b) Excessive amounts of oil are dangerous. Valves and cylinder walls should not be over-wet with oil.
d. Improper cooling. Failure of cooling water circulation.
e. Carbonization of oil and ignition of carbon particles in presence of high pressure air. Apt to occur in receivers and lines close to compressors.
f. Compression of dangerous mixtures caused by suction leaks outside of compressor or by dangerous mixtures in the return gases.
g. Charging containers with high pressure gas before properly purging the containers to remove any gas or oil vapors that may be present or the reciprocal of this.
h. Danger from breaking high pressure connections, copper tubing, small iron pipes, etc. Danger from whipping and swiping movement of broken pipe. Danger from ignition of gas and gas air mixtures caused by brush discharge through broken connections.
   A slight tap on a high pressure tube may cause the loss of a hand, a fire, or something more serious.

2. Causes of explosions in pipe lines.

a. Placing exhaust lines and distribution lines close together in the same ditches at the compressor plants.
b. Accumulations of oxides and sufides which are subject to spontaneous combustion in the lines.
c. Suction of air into return gas lines giving rise to explosive mixtures.
d. Friction and brush effects of loose particles impinging against walls of pipes, especially at short turns, elbows, etc.
e. Leaks through corrosion pits, breaks, etc. in lines, giving rise to excessive velocity of gas with suspended particles of rust or sulfides causing friction impact and brush effects.
f. Lightning: Lightning striking a return gas line may ignite the air gas mixture in the line or may break the line, causing a fire and explosion by a brush discharge or big frictional and impact effects in the line.

3. Safety precautions.

a. In general, try to eliminate conditions that are dangerous.
b. Avoid the possibility of sucking air and gas into the same compressor at the same time.
c. If one compressor is used for the compression of air at one time and gas at another time, be sure to purge the compressor at the beginning of each change.
d. Examine valves and cylinders of compressor frequently to ascertain the condition of lubrication. Remove excessive oil by wiping and washing with soap solution. Can use soap solution for lubrication for short intervals at a time to wash out excess of oil.
e. Install thermometers for watching the temperature of compressors.
f. Have positive water circulating system and control the rate of water circulation at the outlet valve. Have inlet valve wide open so as to keep the cooling water system full at all times while compressor is running.
g. Don't use corrosive cooling water. Corrosion is said to be a common cause of compressor failures.
h. Use automatic controls to stop compressors when anything goes wrong with the cooling water system or the temperature of the compression system.
i. Make frequent analysis of return gases at repressuring plants.
j. Install explosion arrestors. Tubing, casing, or line pipe filled with iron turnings is not good because the iron rust or iron sulfide formed in such contraptions are sources of danger. Earle of the Navy department recommends brass turnings instead of iron.
k. Use adequate pop-off valve on discharge line from compressor.
l. Use safety discs or fusion plugs on lines, especially close to compression plant.
m. Install proper oil drip a short distance down stream from compressor.
n. Eliminate sharp angular turns in lines. Make long sweeping turns by curved pipe where possible.
o. Avoid projections in lines against which suspended particles in gas will impinge.
p. Introduction of slugs of air and gas, or slugs of exhaust gas into the distribution lines by introducing these gases intermittently at the compression plant.

ators are supposed to allow compressors to run for about 20 minutes to thoroughly purge the system before pressure is allowed to build up in the lines.

There have been records of line explosions even when compressors have been run for 20 minutes for purging. On gas lines drips are installed for the collection of gasoline which may condense out in the lines. If these drips are not drained before the lines are purged of gas or during the purging operation preparatory to switching over to air an explosion may result when pressure is built up due to gasoline vapors from the drips being mixed with the compressed air. It is said that air containing from 1.5 to 6 per cent gasoline vapors is explosive and that gasoline has an explosive force 84 times as great as dynamite.

The draining of gasoline drips before changing to air seems to be more difficult to impress on workmen. Probably this is because the drips are out in the field some distance from the compressor plants.

The mere fact that some gasoline is collected in drips and made at the gas lift plants creates a hazard. Safety men have come to the conclusion that wherever gasoline is available men will use it despite any rules which may be adopted. Gasoline is so handy and has so many uses. Recently at an air plant a workman was observed cleaning an engine part with a gasoline soaked rag only a few inches from a red hot exhaust pipe.

Another workman decided to use gasoline to thaw out a regulator one cold morning recently. He went over to the regulator carrying a cloth and an open bucket of gasoline. On the way some of the gasoline was spilled on his clothing. The workman soaked his cloth in gasoline, placed it on the regulator and after removing his bucket of gasoline to a safe distance set fire to the rag. He neglected to move himself also to a safe distance and was badly burned when his gasoline soaked trousers caught fire.

One company recently mimeographed a recent series of notes on explosion hazards in re-pressuring old oil properties prepared by R. Van A. Mills of the U. S. Bureau of Mines, and sent it to all superintendents and employees at gas lift plants.

New Brokerage Firm Formed

NEW YORK, Feb. 18.—The formation of a new brokerage firm under the name of M. B. Whitney & Co. was announced to the New York oil trade this week. Marcus B. Whitney, until recently credit manager for Seaboard Midland Petroleum Corp., is listed as a general partner, and Ernest G. Stillman, a newcomer in the oil business, a limited partner. The firm has offices at 11 Broadway and will broker crude oil and products, specializing in cargo lots.

Cross Gains Renown In Religious Work

CHICAGO, Feb. 20.—Henry H. Cross, founder and active head of the oil company which bears his name at 122 S. Michigan ave., Chicago, is also distinguished as the builder and teacher of the largest Sunday school class of young men in the world. Mr. Cross does not claim that distinction but persons in Chicago who are acquainted with Sunday school work say they know of no other young men's class that equals it in attendance.

The class represents a little more than three years work on the part of the oil man and his assistant teacher, W. G. Winn who is associated with Mr. Cross in the Henry H. Cross Co.

Starting in September 1924 as a substitute teacher of the "Boys' Class" at the Edgewater Presbyterian church, Mr. Cross took charge of three young men one Sunday morning in a dingy basement room under the sidewalk. Now the class has an enrollment of 675 and meets in the gymnasium, the pride of the congregation and nationally known.

Mr. Cross points with gratification to the fact that 215 of his students have embraced Christianity and come into the church in the last two years. Out of a total enrollment of 675 his class has an average attendance of 400. Moreover, these young men are financing the scholarships of two young men every year who are studying for the ministry.

Mr. Cross had 15 or 20 years experience as a Sunday school man before he identified himself with the Edgewater Presbyterian church five years ago. Mr. Winn was formerly a minister of the Disciples church. He started to work for the Henry H. Cross Co. in 1922. Mr. Cross has been under the care of a doctor for about two years and has had to be away from his business much of the time. He says this has enabled him to devote a great deal more time to his class.

Unlike a great many Sunday school teachers, Mr. Cross will not permit his class to run down to nothing and suspend work during the summer months. In the summer of 1927 the Cross class maintained an average attendance of 150 all during the hot weather when a great many of the members were out of the city on vacation. The young men's ages range between 16 and 24 years.

Starting with three, the Cross class numbered 18 in a month's time. In the spring of 1925 it reached 40. In December 1926 the enrollment was raised by a membership drive to 211. When the congregation dedicated its new building on June 12, 1927, 300 were present. Five hundred was the mark set for the year and on Dec. 18 it reached 511. The boys and their parents filled the 720 seats on the main auditorium.

The class holds two big events a year; an excursion on the last Friday in June and a banquet each Friday before Christmas. The last banquet was held at the Edgewater Beach hotel where covers were laid for 525 boys and 350 parents as invited guests. Late in January 1928 Mr. Cross started a vacation on instruction from his doctor and Mr. Winn is in charge of the Sunday school work.

Dr. Chase Palmer, Research Chemist, is Dead

SAN FRANCISCO, Feb. 18.—Dr. Chase Palmer, a chemist internationally known among petroleum engineers and geologists for his studies of oil field waters and for his widely used system of interpreting water analyses, died at his home in San Francisco on Nov. 18, 1927. For the past few years he had been doing research and consulting work on chemical problems with special reference to oil field waters and their relations to the occurrence and recovery of oil. At the time of his death he was studying the application of water analyses to serious corrosion problems on the Pacific coast.

Dr. Palmer was born at Saco, Maine, in 1856. He studied at Princeton and Johns Hopkins universities. He taught at the Massachusetts Institute of Technology, Tufts, Wabash, Central University of Kentucky, and Kentucky State college. For about four years he operated lead and zinc mines in Missouri.

While connected with the colleges in Kentucky Doctor Palmer did some work on the waters of the state for the United States Geological Survey. In 1907 he began work with the Survey in Washington and for 12 years was engaged on problems relating to natural waters in their geochemical relations and on questions of ore position and enrichment, including some phases of rock analysis. His system of classification of natural waters with reference to their geologic relations has been widely used by geologists, particularly in connection with oil-field waters. The Palmer classification of waters is noted in the literature of oil geology throughout the world, and is used almost universally in the laboratories of the oil industry in the United States.

In 1919 Doctor Palmer went with the Southern Pacific Co. to aid in the development of oil fields in California. In 1921 he took up private consulting work relating to water, oil, and allied subjects and was actively engaged almost to the end.

Protecting Piping is Necessary For Bulk Storage Tanks

CLEVELAND, Feb. 17

THE importance of properly safeguarding piping leading to bulk storage tanks, as well having the tanks themselves properly constructed and vented, was brought out in the report on a fire at the plant of the Pure Oil Co., at New Rochelle, N. Y., last October, presented in the quarterly of the National Fire Protection Association.

The danger of having a dike around a tank so deep that it cannot be properly ventilated, thereby allowing vapors to collect there, was also emphasized in the report on the same fire. The fire took place when vapors at the bottom of the dike were ignited in some way and the piping leading into the bottom of a tank was disrupted. The Pure Oil plant adjoined a similar bulk station belonging to the Standard Oil Co. of New York. The summary of the report was:

"This fire illustrates the good performance that may be expected from properly constructed and vented all-steel tanks. On the other hand, it illustrates in a striking manner how the benefits of good tank construction can be largely lost through failure to properly safeguard piping. An emergency valve inside or immediately adjoining the tank with provisions for closing from outside of dike is also indicated as necessary.

"This fire also indicates that a dike so deep as to prevent easy ventilation may permit conditions to arise where a considerable explosion may occur. Had the tanks involved here been provided with overflow lines and with swing joints on outlet or fill lines, as in the case of the Standard Oil tanks, it would not have been possible to overflow them during filling operations and a rupture of the piping might not have occurred."

The report of the fire, as given in the quarterly, goes on to say:

"At shortly before 6.30 p.m. on Oct. 31 a fire occurred at the plant of the Pure Oil Co. at New Rochelle, N. Y. This plant adjoins that of the Standard Oil Co., the general arrangement of buildings and tanks is shown in the accompanying plan.

"The fire originated within the dike enclosing the two Pure Oil tanks labeled 1 and 2 on the plan. These tanks are of all steel construction one being 25 feet high and 18 feet in diameter and the other 26 feet high and 18½ feet in diameter. Their respective capacities are 56,000 gallons and 59,000 gallons. Each tank is provided with a 2-inch vent and a circular explosion hatch about 2 feet in diameter; the latter are provided with hinged covers held in place by weight only and arranged to close automatically when opened by pressure from within.

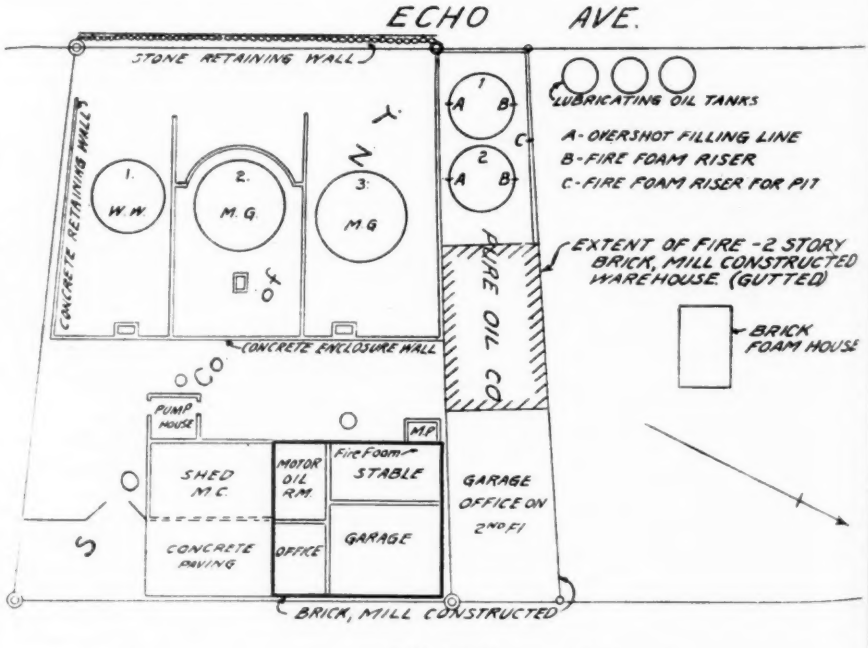
"The tanks are located on low ground not far from the bay and 18 feet below the grade of and close to Echo avenue; one tank is located only 7 feet from the street line. By ordinance a tank must be enclosed by a dike holding 1¼ times the tank capacity. These two tanks are too close together to permit the erection of separate dikes, hence a single rectangular, reinforced concrete dike 51 feet by 27 feet was constructed enclosing both tanks; the east wall is built against the side wall of 2-story, mill constructed warehouse and the west wall against the bank extending up to Echo avenue. The dike walls form an enclosure or pit ranging in depth from 11 to 13 feet. Both tanks were equipped with a foam system; the power line to the pumps was overhead and in close proximity to the tanks.

"On the afternoon of the fire the two tanks were being filled by pumping from a barge located in the bay. Shortly after 6 p.m. the fire department was notified that one tank was overflowing. The deputy chief started to investigate but before he reached the plant an explosion occurred; on arrival he found the pit on fire and the flames reaching to a considerable height. A light northeast wind was blowing at the time.

"The explosion destroyed the foam system power lines and it was only after considerable delay that an emergency line was established, connected to the pump motors and foam discharged into the tanks and pit. A portable foam generator from a nearby city was also used in an attempt to extinguish the fire in the pit. In the meantime the fire department pumped water into the pit in order to keep the gasoline floating on the surface and to prevent it from seeping through the ground to the nearby bay. The foam did not appear to be of great value, but this may have been due to the fact that hose lines were being played into the pit at the same time. It is also well established that much of the foam discharged under such conditions is carried away by the updraft of the fire, some is broken up by the fire, and that only a greatly diminished amount reaches the seat of the fire.

"The fire spread to the Pure Oil Co.'s 2-story brick warehouse immediately adjoining the tanks on the east, and destroyed a considerable portion of it. It also blistered the nearest tank of the adjoining Standard Oil Co. plant on the south. On the west the heat radiation caused the tar in the composition roofing of a frame dwelling 70 feet away to melt, ignition being prevented by hose streams. The fire burned until about midnight, apparently consuming the entire contents of both tanks.

"With reference to origin, it is probable that during the filling of these tanks a considerable quantity of vapor was discharged into the pit, since conditions after the fire plainly indicate that the explosion occurred within the pit. If, as reported, one of the tanks overflowed, the presence of vapor within the pit is accounted for. The dike or pit is of such depth as to form a pocket not readily cleared of vapors by normal air currents, hence it is probable that the presence



Layout of Pure Oil and Standard of New York bulk plants involved in New Rochelle fir

of vapors therein was a more or less permanent condition. A board fence had been built along Echo avenue and it is possible that vapors seeped through this to a point where means of ignition were afforded and resulting in a flash-back to the pit, or some one may have thrown a lighted match over the fence into the pit.

"An inspection of the tanks failed to disclose any open seams, but the explosion had apparently broken the pipe lines leading into the bottom of the tanks. The roofs of the tanks were found intact, so it is evident that gasoline was discharged through the broken pipe lines and not through any rupture of the tanks. While considerable internal pressure was created by the fire, the venting facilities provided were evidently sufficient to safely relieve it. In this connection, it was stated by the officer in command at the fire that the covers of the explosion hatches were seen to open and close at frequent intervals during the fire.

"An interesting feature of this fire was its effect on the adjoining plant of the Standard Oil Co, where building construction is of mill and metal clad types. The buildings were not damaged. The three tanks, as shown on the accompanying plan, are of all-steel construction, each equipped with two 2-inch vents of the vacuum and pressure relief type. These tanks are provided with fill lines which enter at the bottom, and each also has an overflow or return line to prevent overflowing of tank. Fill line connections to tanks are made by swing joints. A dike consisting of 3 bays encloses the tanks. At the time of the fire the tank closest to the Pure Oil Co. plant contained about 4,000 gallons of gasoline, an amount sufficient to take up about 1 foot of the depth. As a result of water discharged past the flames, the bay in which the last mentioned tank is located was filled with water and the tank floated off its base; the swing joint functioned, however, no pipe connections were broken and no oil was lost. The tank was only slightly blistered on the side exposed."

E. M. Smith Heads Bank Board

LOS ANGELES, Feb. 17.—At a meeting of the directors of the Pacific National Bank of Los Angeles, held this week, E. M. Smith, former president of the bank, was made chairman of the board and Thomas S. Morrissey elected president. Mr. Morrissey was formerly vice president of the Merchants National Trust and Savings Bank of Los Angeles. Mr. Smith is president of the Emsco Derrick & Equipment Co. and also heads a number of other concerns selling to the oil industry. Many oil men are stockholders in the Pacific National.

Senate Probers to Ask Blackmer's Son Where Bonds Went

Staff Special
WASHINGTON, Feb. 20

MYRON F. BLACKMER, son of H. M. Blackmer fugitive witness in the Teapot Dome and Continental Trading Co. scandal, has been summoned to appear Feb. 23 before the senate committee on public lands to be asked what he knows about disposition of approximately $2,000,000 of Liberty bonds in which the profits of the Continental company were invested, and trace of which has not yet been found.

More than $1,000,000 of Liberty 3½ bonds have been traced by the committee so far: $233,000 to Albert B. Fall, former secretary of the interior; $800,000 to James E. O'Neil, another fugitive witness, who returned the bonds later to the Prairie Oil & Gas Co., of which he was formerly the head and $24,000 to the Republican National Committee to defray part of the deficit of the Harding campaign of 1920.

Senator Thomas F. Walsh of Montana, who is "prosecutor" of the senate committee, announced today that government experts had established the fact in New York that $75,000 more of the Continental's bonds had been applied to the Republican deficit.

The program for examinations this week calls for testimony from Harold W. Kenwell, secretary of the Hyva Corp., Harry F. Sinclair's family holding company; Graham Youngs, treasurer of Blair & Co., a banking house of New York, and Robert Rae, New York agent of the Dominion Bank of Canada from which H. S. Osler, organizer of the Continental, bought the bonds.

Kenwell is to produce books and documents showing the receipts by the Hyva Corp. of Liberty bonds between 1920 and 1923, and their disposition.

Youngs is to bring all books showing dealings in Liberty 3½s by either the Hyva Corp. or Sinclair himself since November 21, 1921.

Rae is to bring books and correspondence showing any transactions in Liberty bonds with the Continental Trading Co. and Osler between 1921 and 1925.

Deepening of the political tinge was caused by Chairman Nye of the investigating committee, by George W. Wickersham, attorney general in the Taft administration now employed as attorney for the Senate in its proceedings against Robert W. Stewart, and Representative Hull of Tennessee, Democratic leader of the House of Representatives.

Nye set Hull into violent eruption, in a political sense, by observing, in the course of the examination by his committee, that it would be interesting to know whether any of the Continental Trading Co. Liberty bonds helped to reduce the Democratic National Committee debt from $600,000 to $200,000 between 1920 and 1922.

"The publication broadcast throughout the country this week," said Hull, "unsupported by a scintilla of fact, intimating that a portion of the Sinclair Continental Trading Co. oil bonds was received in 1922 or thereabouts and applied on the deficit of the Democratic National Committee, constitutes as false and foul a libel as was ever perpetrated.

"I brand this as a base and deliberate falsehood, intended solely to divert attention from the unspeakable National Republican Committee scandal in connection with the corrupt oil money of the Continental Trading Co., a portion of which is now traced straight to the Republican National Committee."

Hull called on President Coolidge, in fact demanded, that he and other Republican leaders "throw the full power of their co-operation" behind the efforts to uncover bond transactions involving the Continental Trading Co.

Mr. Wickersham's contribution was contained in a brief filed by him demanding that the court which had taken Stewart from the custody of the Senate by a writ of habeas corpus, return him to the custody of the Senate because his arrest was not a judicial but a legislative proceeding, as claimed by Stewart, to bring him before the bar of the Senate to answer questions he had refused to answer when propounded by the committee. Stewart claimed, among other things, that the questions were not in aid of legislation but a mere prying into private affairs.

Wickersham asked if there could be anything private in the transactions between the representatives of two great oil companies for the procurement of a profit of between $2,000,000 and $3,000,000 to a paper corporation, which profit was then invested in government bonds "some of which were demonstrably used to corrupt a former cabinet officer of the United States; others apparently to pay the debts of great political parties."

"Of great political parties," the words used by Wickersham in addressing the court, put into the formal record the charge which Hull said was a base and deliberate falsehood constituting as false and foul a libel as was ever perpetrated.

Stocks by Days Down Over Five Years

TULSA, Feb. 20.—Gasoline stocks at refineries in the United States have been lower in terms of days supply since May, 1927, than at any time in the past five years, according to H. K. Davis, statistician of the Western Petroleum Refiners Association. Mr. Davis figures days supply of stocks on the basis of expected consumption during a future period rather than on past consumption.

The chart below from the current bulletin of the association shows the course of U. S. refinery stocks of gasoline by months from 1923 to the close of 1927. From this chart it will be seen that in 1927 gasoline stocks exceeded the 1926 level only at the close of February, March and April and that 1926 stocks were lower than those of the three previous years at the close of each month.

Mr. Davis calls attention to the fact that the upward trend of gasoline stocks during the closing months of 1927 was much less precipitate than in 1926. In the early fall gasoline stocks were down to 32 days supply and had risen to only 41 days supply on Dec. 31. The 32 day level was maintained until the end of October. In 1926 the low point was 39 days supply on August 31. From that time onward the increase was rapid. At the end of December stocks were up to 55 days supply.

In arriving at the level of stocks in terms of days supply at a future rate of consumption for November and December, 1927, Mr. Davis assumed that the rate of increase in refinery shipments in January and February, 1928, would be the same as the average for the past six months.

Rebuilding Long Beach Refinery

LOS ANGELES, Feb. 18.—Edington-Witz Refining Co., 516 Roosevelt building, Los Angeles, which recently took over the Wadeoline Refining plant at 2848 Cherry ave., Long Beach, is rebuilding the plant. It is expected that the new plant, which is to have a charging capacity of 3,000 barrels a day, will have its first test run about March 1. This is to be a skimming plant, making gasoline, kerosene, gas oil and fuel oil.

Officers of this company are C. B. Edington, president; H. J. Witz, vice president in charge of refining operations, and W. E. Snowden, plant superintendent.

Wisconsin Jobbers To Meet March 14

MILWAUKEE, Feb. 18.—A meeting of the Wisconsin Independent Oil Jobbers Association will be held at the Plankinton Hotel here on March 14, according to J. M. McLaughlin, secretary. Directors will meet on the evening of March 13.

J. H. Greer, Pure Oil Man, is Dead

TULSA, Feb. 18.—J. H. Greer, general superintendent of production for the southwestern division (Oklahoma-Kansas) of the Pure Oil Co., died Feb. 17 at St. John's hospital, Tulsa. An operation for appendicitis was followed by peritonitis.

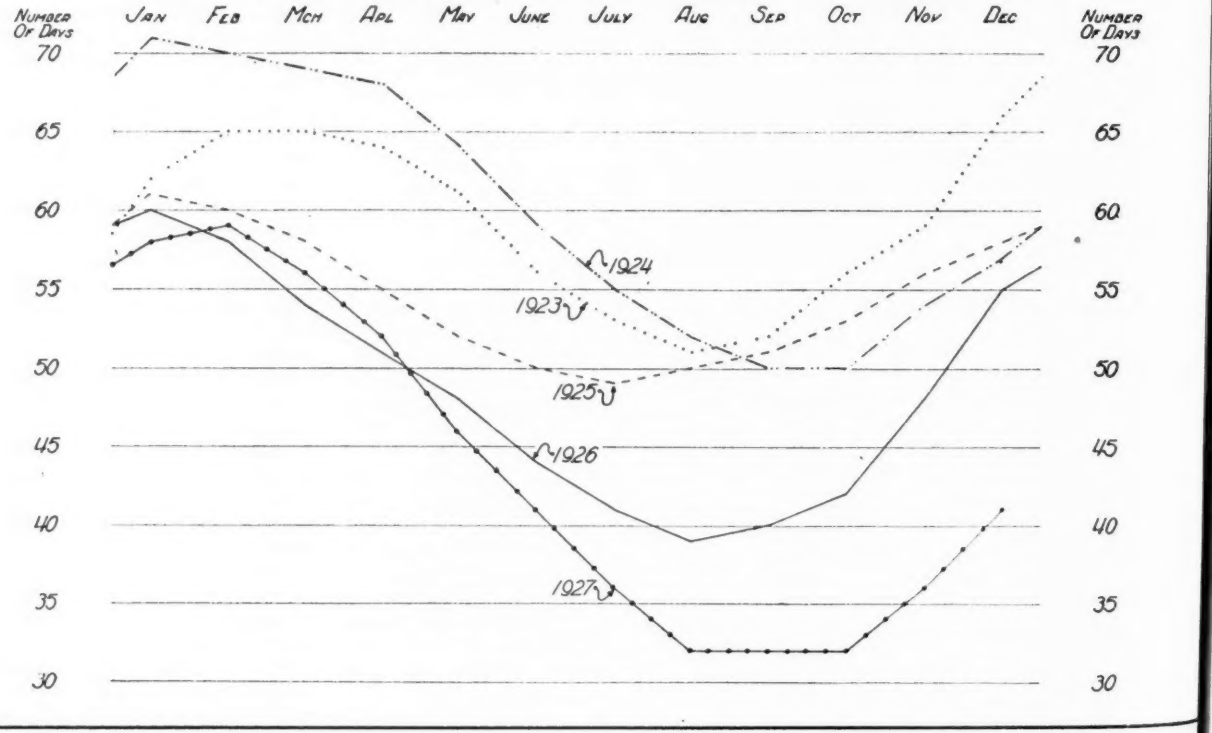
Mr. Greer was 51 years old. He was born at Duke Center, Pa. He worked for the old Pure Oil Co. in Pennsylvania and in the Illinois fields. He came to Oklahoma and after a period of service with the National Supply Co. entered the employ of the Producers' Oil Co., which later went into The Texas Co.

In 1916 he became superintendent for the Humphreys interests at Mineral Wells, Texas, remaining with Humphreys until the Pure Oil Co. bought the Mexia district holdings, whereupon he was transferred to the Arkansas district. He came to Tulsa as division general superintendent last November.

He is survived by his widow and one son.

LOS ANGELES, Feb. 16.—Robert J. Miller of Houston, who handles the sales in Texas for Fluid Packed Pump Co. and Shaffer Tool Works, is spending this week in California picking up new ideas. His return to Texas will be over land and will include a tour through the west Texas fields.

DAYS SUPPLY OF GASOLINE AT UNITED STATES REFINERIES
(Based on Average Daily Shipments During Immediately Succeeding Months)



Union Oil Sales Grow but Profit Falls; $10,000,000 Spent on Additions

CLEVELAND, Feb. 18

ALTHOUGH gross sales of the Union Oil Co. of California were larger last year than in any previous year, $80,273,327, a gain of $329,576 over 1926 sales, net profit was $10,048,494, a decrease of $1,783,125 from 1926 profit. Profits in 1927 averaged $2.65 each $25 share and $3.12 in 1926.

The Union sales consisted of 31,280,006 barrels of products last year, compared with 30,830,007 barrels in 1926. Last year, President W. L. Stewart reported to stockholders, there was a gain in sales of every product at home and abroad with the exception of fuel oil. Kerosene and lube business showed a healthy growth, he said.

The Union's production of crude oil amounted to 15,389,681 barrels last year, subject to royalties, compared with 16.036,184 barrels in 1926, a decrease of 646,503 barrels. Its production in Colorado and Wyoming was 1.206,694 barrels, compared with 1,134,389 barrels in 1926.

Its production Dec. 31 was 38,300 barrels of oil and casinghead gasoline from 642 wells. It had 177 wells shut in which had potential production of 19,000 barrels daily average. The company early this month was purchasing an average of 75,000 barrels of crude a day.

Its annual production in the last 14 years has been:

*1927.....	15,389,681	1920.....	8,683,608
1926.....	*16.036.184	1919.....	8.705.447
1925.....	14.036.952	1918.....	8.271.084
1924.....	15.036.952	1917.....	7,430.154
1923.....	18.808 813	1916.....	6.081 015
1922.....	12.453.846	1915.....	5.301.110
1921.....	10.217,835	1914.....	5,534,239

*Subject to royalties.

The company's production, purchases and other receipts of crude oil last year totaled 32,712,182 barrels. With production and purchases of natural gasoline, and purchases of refined and semi-refined oils, the company handled 35,856,041 barrels of petroleum and products, compared with 32,712,182 barrels in 1926. The company handled 15 per cent of the 242,625,582 barrels of crude oil and casinghead gasoline produced in California last year.

At the end of the year Union had 24 strings of tools operating. Sixteen of these were in southern California, one in the San Joaquin valley, two in the Ventura field, one in the Santa Maria field, and four in Wyoming and Colorado.

During the year it used 19,300,000,000 cubic feet of gas for lifting, resulting in a substantial increase in oil and natural gasoline production, President Stewart reported.

Union spent $10,688,969 on properties last year and relinquished lands, abandoned wells, and wrote off other property to the amount of $5,082,583, leaving a net gain of $5,606,386 in the property accounts. It relinquished approximately 20,000 acres of land it held in fee and increased its leaseholds 17,000 acres. Total acreage held Dec. 31, 1927, was 3,054 acres less than that held Dec. 31, 1926. The holdings at the end of 1927 were distributed as follows:

	Fee	Leasehold	Total
California.....	170.436	22,703	193,139
Colorado.....	19,592	6.412	26 004
Wyoming.....	720	17,813	18.533
Texas.....	.....	18.616	18.616
Utah.....	.....	3,960	3,960
Mexico.....	272	198	470
Colombia, S. A...	405.524	.....	405.524
	596,544	69,702	666,246

The foregoing acreage is in addition to a half interest in 880,000 acres of concessions in Venezuela.

The company spent considerable money last year in correcting hazards revealed in its two disastrous crude oil fires in April, 1926. Three reservoirs at its San Luis Obispo tank farm were reconditioned and protected against lightning. Steel tank roofs were installed. Fire protection equipment and steel tankage were installed at the Los Angeles and Oleum refineries.

Almost $1,900,000 was spent on additions to refineries, natural gasoline absorption plants, and gas handling facilities. The normal capacity of the refineries including the cracking stills, was 100,000 barrels Dec. 31, and natural gasoline plants were capable of handling 115,000,000 feet of gas daily.

More than $1,900,000 was spent in expanding its market outlets. During the year it added 18 bulk plants and 10 service stations. It bought 45 tank cars, 174 automobiles and 69 trucks and trailers. Dec. 31 it had 350 bulk stations in the United States and other countries, 415 service stations, 675 tank cars, 1,166 motor trucks and 992 other automobiles.

It organized with the Atlantic Refining Co. the Union Atlantic Oil Co. to distribute petroleum products in Australia. Formation of this company was announced last fall in NATIONAL PETROLEUM NEWS.

Current assets Dec. 31 amounted to $57,777,078 and were 6 to 1 of current liabilities, which totaled $9,649,642. Current assets increased $1,452,627 during the year and current liabilities increased $59,200. Net working capital Dec. 31, 1927, was $48,127,436.

The oil inventory of $26,749,990 was made up of 21,814,025 barrels of crude and products, an increase of 3,783,861 barrels during the year. The inventory is carried at current cost. Its stocks of fuel oil Dec. 31 was 12 per cent of fuel stocks on the Pacific coast.

During the last 28 years Union has paid cash dividends totaling $80,854,413 and stock distributions at par

Summary of Union's Operations, Expansion and Equipment in 1927

	1927	1926	1925
Oil lands, rights, leases	$ 848.307	$ 694.897	$ 671.584
Cost of drilling and field development	5,521.017	7,473.350	6,580.700
Additions to pipe lines	659,880	653.375	214.468
Additions to marine equipment	0	305.366	208.361
Additions to refinery, gasoline and gas plants	1.885.280	4.644.655	1.209.606
Additions to marketing equipment	1,912,369	1,425,256	1,887,039
Total expenditures for additions to properties	$10,688,969	$15,196,900	$10,771,757
Wells operating or shut in, Dec. 31	819	781	617
Wells drilling	24	*148	*157
Production, subject to royalties, bbls.	15,389,681	16,036,184	15,360.640
Trunk pipe lines, miles	501	500	504
Gathering lines, miles	360	351	343
Capacity of pipe lines, bbls. a day	245.000	245.000	275.000
Refining capacity, bbls. a day	100 000	100 000	90 000
Capacity of gasoline plants, thousand cu. ft. a day	115,000	116.000	90.000
Tank cars	675	630	608
Marine equipment, number of vessels	33	35	34
Capacity of marine equipment, bbls.	900.000	974,700	960.700
Motor trucks	1.166	1.102	1.048
Other automobiles	992	931	856
Foreign and domestic bulk stations	350	329	303
Service stations	415	413	423
Sales for the year	$80,273.327	$79,943.751	$74,378.772
Profit a share, on average no. of shares outstanding	$2.65	$3.12	$2.78

*Drilling or inactive.

Income Accounts of Union and Owned Companies

	1927	1926	1925	1924	1923
Operating profits	$25,638,087	$29,457,978	$27,082,279	$27,334,032	$24,357,393
Expenses, taxes, etc.	4,268,728	4,621,849	4,392,099	4,415,712	3,237,115
Operating income	$21,369,359	$24,836,129	$22,690,180	$22,918,320	$21,120,278
Interest	495,958	760,105	736,649	904,860	776,394
Deprec., deplet., etc.	10,824,907	12,244,495	11,440,325	11,309,412	12,311,235
Net profits	$10,048,494	$11,831,619	$10,513,206	$10,704,048	$ 8,032,649

totaling $59,745,993, a grand total of $140,600,406, or 13.5 per cent a year on the average outstanding capital stock during the 28 years. To surplus has been added $65,706,670, equivalent to 6.3 per cent a year on the average outstanding stock.

The 1927 pay roll totaled $18,261,867 and the 1926 pay roll $17,815,352. Dec. 31, 1927, it had 9,054 employes and 8,927 a year earlier.

Balance sheets of Union Oil Co. and owned companies as of Dec. 31, 1926 and 1927, compare:

ASSETS

	1927	1926
Oil lands, leases	$149,623,951	$149,281,516
Wells, development	48,765,057	46,687,003
Gasoline plants	5,025,309	4,511,511
Pipe lines, storage	15,959,086	15,397,458
Marine equipment	12,674,574	13,170,205
Refineries	17,441,357	16,279,968
Market stations	24,658,159	23,213,446
Total property	$274,147,493	$268,541,107
Investments	1,213,875	715,399
Cash	9,205,209	8,406,949
U. S. and other bonds	9,000,000	10,200,000
Bills receivable	511,427	512,547
Acct's receivable	8,688,187	8,145,875
Employes' stk. subs.	116,405	244,371
Crude, refined oils	26,749,990	24,813,766
Material, supplies	3,505,859	4,000,943
Deferred charges	635,350	545,271
Total	$333,773,796	$326,126,229

LIABILITIES

Capital stock	$94,798,100	$94,715,450
Employes' stk. subs.	203,275	290,625
Mortgage debt	23,810,500	22,757,500
Accounts payable	5,416,770	5,406,215
Tax reserve	3,883,091	3,837,219
Accrued interest	349,781	347,008
Reserves	144,695,445	132,204,504
Surplus	*60,616,834	66,467,708
Total	$333,773,796	$326,126,229

*$6,339,344 transferred from appreciated surplus to depletion reserve.

Shutdown Will Continue In Two Seminole Fields

TULSA, Feb. 21.—Seminole district operators in meeting this afternoon voted to continue shutdown policy on two fields where agreement expires March 1 for 30 days and to end shutdown on new area south of Little River field. Probably a dozen or more wells will be started on March 1 around wells which have recently extended Little River to the south. It was voted to ask committee and Umpire to suggest locations for test wells in this area to avoid whirlwind campaign.

Some drilling will be started around well of Independent Oil & Gas Co. in 23-7-6 which has been pinched to 100 barrels daily for several weeks. It will be drilled in and produced beginning March 1. The two areas where shutdown is extended to April 1 are 33-8-6 and 5-7-7, both areas having one well each pinched to less than 100 barrels daily.

TULSA, Feb. 21.—Continuing its policy of consolidating its holdings for future development, the Skelly Oil Co. has purchased the half interest of Hartman & Skaer in the SW of section 24-24-8, Reno county, Kan. for a reported consideration of $17,500.

The property, which was formerly owned jointly by the Skelly Oil Co. and Hartman & Skaer, consists of a lease on 160 acres on which there is a production of about 35 barrels a day from one well, the No. 1 Smith, located in the center of the quarter section. The well was drilled in about one year ago.

Refinery to Double Capacity After Fire

LOS ANGELES, Feb. 21.—Due to a recent $25,000 fire at the Orange County Refining Co.'s plant, located at Newport, which destroyed the coolers, warehouse, tanks and derrick of an adjoining well, plans are being made to rebuild and enlarge the plant. This is the second fire at this plant the past year and started from defective wiring.

The most modern equipment is to be installed, and when fully restored, the Orange County Refining Co. plant will have an increased capacity of about 100 tons of asphalt per day, or about 100 per cent increase. This company is building up a wide trade, manufacturing exclusively asphalt for all trades.

Battenfeld Plant Capacity Doubled in Nine Years

Staff - Special

KANSAS CITY, Mo., Feb. 21.—Completion recently of two additional buildings by the Battenfeld Grease & Oil Co. here, doubles the capacity of that company's plant, and gives it a 600 per cent increase in floor space over that with which it started in business in February, 1919.

Improvements and additions to equipment have just been made in the plant. Seven additional grease kettles have been installed; also an automatic filling machine, which is a system of belt conveyors to carry the filled cans to the packing tables, where an automatic nailing machine completes the operations.

The laboratory has been moved so that the chemical engineer is located in a place where he can supervise grease manufacture at all times. The various departments have also been segregated. The cup grease and gun grease is now made in one building and the gear grease, fibre and sponge grease and special grades are made in another building.

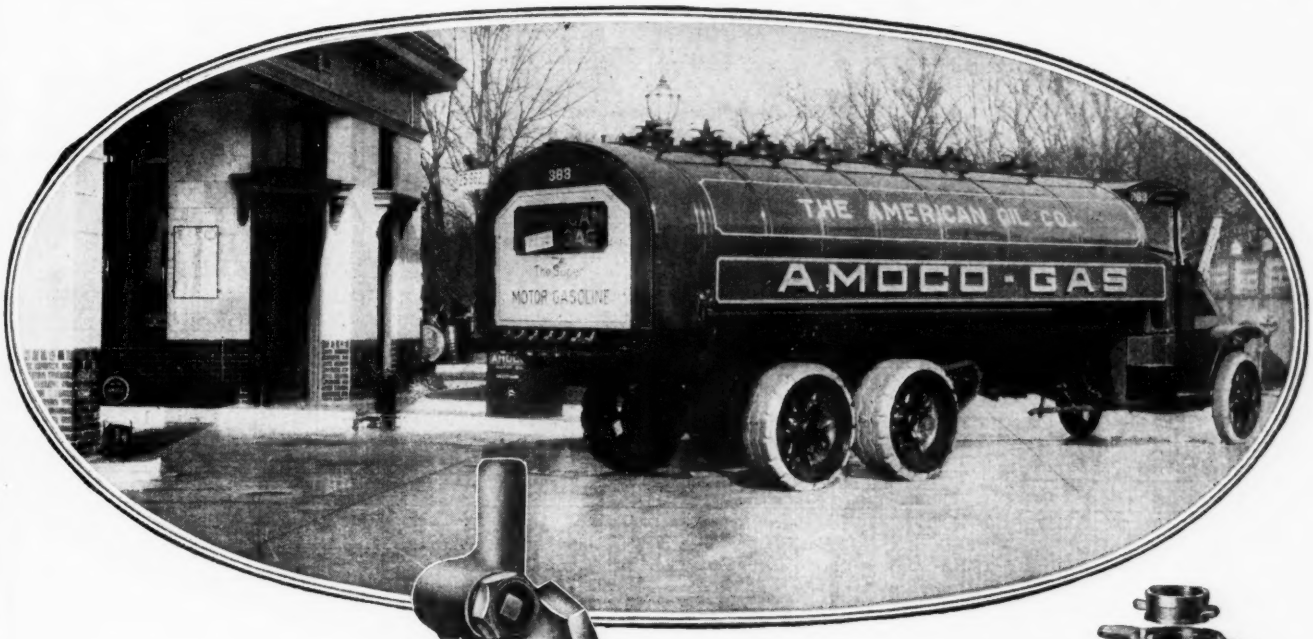
The automatic filling, conveying and nailing machinery will speed up filling of orders, and storage space has been provided for privately labeled grease cans.

The company started in business in a building 60 by 100 feet, one and a half stories high, with 10,000 square feet of floor space, and three grease kettles. It sold 3,000,000 pounds of grease the first year.

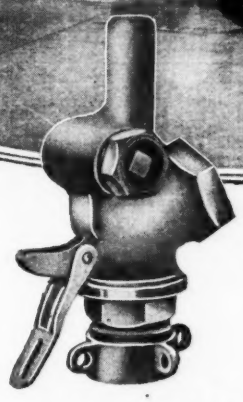
The two following years the erection of a two-story brick and tile building added 10,000 square feet of floor space and in 1922, the plant of the Thomason Petroleum Co., adjacent to the Battenfeld plant, was acquired, which brought the floor space up to 30,000 square feet. Two additional stories were added to the building in 1924.

The two new buildings are 40 by 50 and 20 by 80, and an additional story, 100 by 100 feet, add 17,500 square feet, bringing total floor space up to 60,000 square feet.

The latest additions to the plant of the Battenfeld Grease & Oil Co., Kansas City, Mo.



Amoco Tank Truck equipped with seven Wheaton Type A Faucets—like the one more clearly shown in the illustration at the left.



A The American Oil Company Standardizes on WHEATON

YEARS ago The American Oil Company decided to test Wheaton Tank Truck Faucets, Swing Joints and Loading Valves. They bought samples, and put them into test operation. The results proved the excellence of Wheaton *design, material* and *craftsmanship.*

That was the beginning of standardization on Wheaton Fittings thruout the plants of The American Oil Company. Today practically all Amoco Gas flows through Wheaton Fittings—because when once installed they go on year after year performing their service without trouble or expense.

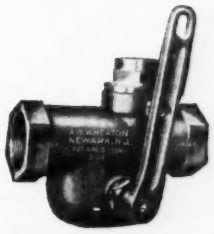
When The American Oil Company standardizes on Wheaton Fittings that is convincing proof of their *excellence.* Send for illustrated catalog.

A. W. WHEATON BRASS WORKS, NEWARK, N. J.

Type 36 Quick Hose Coupling

Type 24 Tank Truck Faucet

Single Swing Joint



Type 26 Loading Valve

Wheaton

FAUCETS · VALVES · JOINTS · COUPLINGS · FILLERS · NOZZLES · FITTINGS

Compilation Of Mid-Continent Refinery Operations

All Rights Reserved to National Petroleum Publishing Co.

National Petroleum News

Mid-Continent Refinery Operations Week Ended February 17 (By Telegraph)

	Kansas	Oklahoma	North & Cent. Texas	North La.-Ark.	Total Week Ended Feb. 17	Total Week Ended Jan. 20
Plants Reporting	12	28	27	12	79	79
Crude Capacity (bbls.)	92,000	157,200	104,500	54,900	408,600	408,600
Cracking Capacity	30,700	52,600	16,200	22,700	122,200	122,200
Da. Av. Crude Runs	55,132 + 8.7	105,174 — 0.3	68,519 + 14.9	48,809 + 3.4	277,634 + 5.5	246,326
Da. Av. Other Oils	6,315 — 4.0	1,966	5,507 — 0.9	1,358+1271.7	15,146 + 30.3	15,780
GASOLINE—Gallons						
Stocks, Feb. 10	13,171,000	48,362,000	19,997,000	3,056,000	84,586,000	78,103,000
Prod. 2-10 to 2-17	8,067,000 + 3.8	16,420,000 + 5.0	7,549,000 + 19.2	4,134,000 + 5.2	36,170,000 + 7.4	33,824,000
Ship. 2-10 to 2-17	7,213,000 — 4.2	14,174,000 — 13.4	6,149,000 + 7.9	3,909,000 — 5.4	31,445,000 — 6.8	32,665,000
Stocks, Feb. 17	14,025,000 + 6.5	50,603,000 + 4.6	21,397,000 + 7.0	3,281,000 + 7.4	89,311,000 + 5.6	79,262,000
Ratio Sales to Prod.	89.4%	86.3%	81.5%	94.6%	86.9%	96.6%
KEROSENE—Gallons						
Stocks, Feb. 10	3,688,000	7,157,000	1,590,000	613,000	13,048,000	13,562,000
Prod. 2-10 to 2-17	1,625,000 + 14.2	2,923,000 + 2.1	1,603,000 + 36.9	749,000 + 2.3	6,900,000 + 11.5	6,170,000
Ship. 2-10 to 2-17	1,985,000 + 23.3	3,161,000 + 7.6	1,190,000 — 2.4	814,000 + 45.9	7,150,000 + 13.1	5,638,000
Stocks, Feb. 17	3,328,000 — 9.8	6,919,000 — 3.3	2,003,000 + 26.0	548,000 — 10.6	12,798,000 — 1.9	14,094,000
Ratio Sales to Prod.	122.2%	108.1%	74.2%	108.7%	103.6%	91.4%
STOVE DISTILLATE—Gallons						
Stocks, Feb. 10	991,000	3,536,000	727,000	55,000	5,309,000	6,690,000
Prod. 2-10 to 2-17	166,000 — 54.0	749,000 + 0.3	129,000 — 47.6	84,000 + 58.5	1,128,000 — 19.8	1,113,000
Ship. 2-10 to 2-17	397,000 — 10.2	729,000 — 12.6	171,000 — 35.0	62,000 — 8.8	1,359,000 — 15.4	1,852,000
Stocks, Feb. 17	760,000 — 23.3	3,556,000 + 0.6	685,000 — 5.8	77,000 + 40.0	5,078,000 — 4.4	5,951,000
Ratio Sales to Prod.	239.2%	97.3%	132.6%	73.8%	120.5%	166.4%
GAS OIL—Gallons						
Stocks, Feb. 10	6,442,000	31,384,000	15,167,000	5,351,000	58,344,000	63,698,000
Prod. 2-10 to 2-17	1,275,000 + 11.5	1,379,000 + 14.4	1,080,000 + 13.8	2,249,000 + 51.3	5,983,000 + 25.1	5,588,000
Ship. 2-10 to 2-17	1,283,000 — 7.8	1,092,000 — 46.8	950,000 + 25.0	1,689,000 + 7.3	5,014,000 — 13.2	7,482,000
Stocks, Feb. 17	6,434,000 — 0.1	31,671,000 + 0.9	15,297,000 + 0.9	5,911,000 + 10.5	59,313,000 + 1.7	61,804,000
Ratio Sales to Prod.	100.6%	79.2%	88.0%	75.1%	83.8%	133.9%
FUEL OIL—Gallons						
Stocks, Feb. 10	10,044,000	30,138,000	37,759,000	13,123,000	91,064,000	93,774,000
Prod. 2-10 to 2-17	5,880,000 + 9.5	7,202,000 + 3.2	9,954,000 + 18.5	6,569,000 + 0.6	29,605,000 + 8.5	25,929,000
Ship. 2-10 to 2-17	5,978,000 — 10.6	7,240,000 + 14.8	7,793,000 — 3.4	6,292,000 + 3.8	27,303,000 + 0.7	27,078,000
Stocks, Feb. 17	9,946,000 — 1.0	30,100,000 — 0.1	39,920,000 + 5.7	13,400,000 + 2.1	93,366,000 + 2.5	92,625,000
Ratio Sales to Prod.	101.7%	100.5%	78.3%	95.8%	92.2%	104.4%

Gasoline Produced by Various Methods, Week Ended February 17

	Kansas	% of Total	Oklahoma	% of Total	Texas	% of Total	Louisiana-Arkansas	% of Total	Total	% of Total
Straight Run	5,059,000	62.7	12,272,000	74.7	6,146,000	81.4	1,824,000	44.1	25,301,000	70.0
Cracked	2,500,000	31.0	3,251,000	19.8	1,116,000	14.8	1,793,000	43.4	8,660,000	23.9
Natural	508,000	6.3	897,000	5.5	287,000	3.8	517,000	12.5	2,209,000	6.1
Total	8,067,000		16,420,000		7,549,000		4,134,000		36,170,000	

+ or — columns are % change from previous week.

Gasoline Stocks Rise 4,725,000 Gallons

Staff Special—By Telegraph
TULSA, Feb. 21

FOR the first time since Jan. 1 79 Mid-Continent refineries in the week ended Feb. 17 reported a substantial increase in gasoline stocks. In the preceding six weeks reports gathered by NATIONAL PETROLEUM NEWS showed gasoline stock reductions in three weeks and only minor stock increases the remaining three weeks.

In the week just ended gasoline shipments fell 2,000,000 gallons from 33,739,000 to 31,445,000 gallons, or 6.8 per cent. Refiners increased their production from 33,670,000 to 36,170,000 gallons, or 7.4 per cent, because of substantial increase in crude runs.

Total stocks of gasoline at reporting plants Feb. 17 were 89,311,000 gallons, compared with 84,586,000 gal-

Summary for the Month

Production and shipments, all reporting refineries, for four weeks ended Feb. 17. Change in stocks figured from Jan. 20.

GASOLINE

	Gallons
Production	136,774,000
Shipments	126,725,000
Net change in stocks	+10,049,000
Ratio sales to production	92.7%

KEROSENE

Production	25,567,000
Shipments	26,863,000
Net change in stocks	—1,296,000
Ratio sales to production	105.1%

STOVE DISTILLATE

Production	5,197,000
Shipments	6,070,000
Net change in stocks	873,000
Ratio sales to production	116.8%

GAS OIL

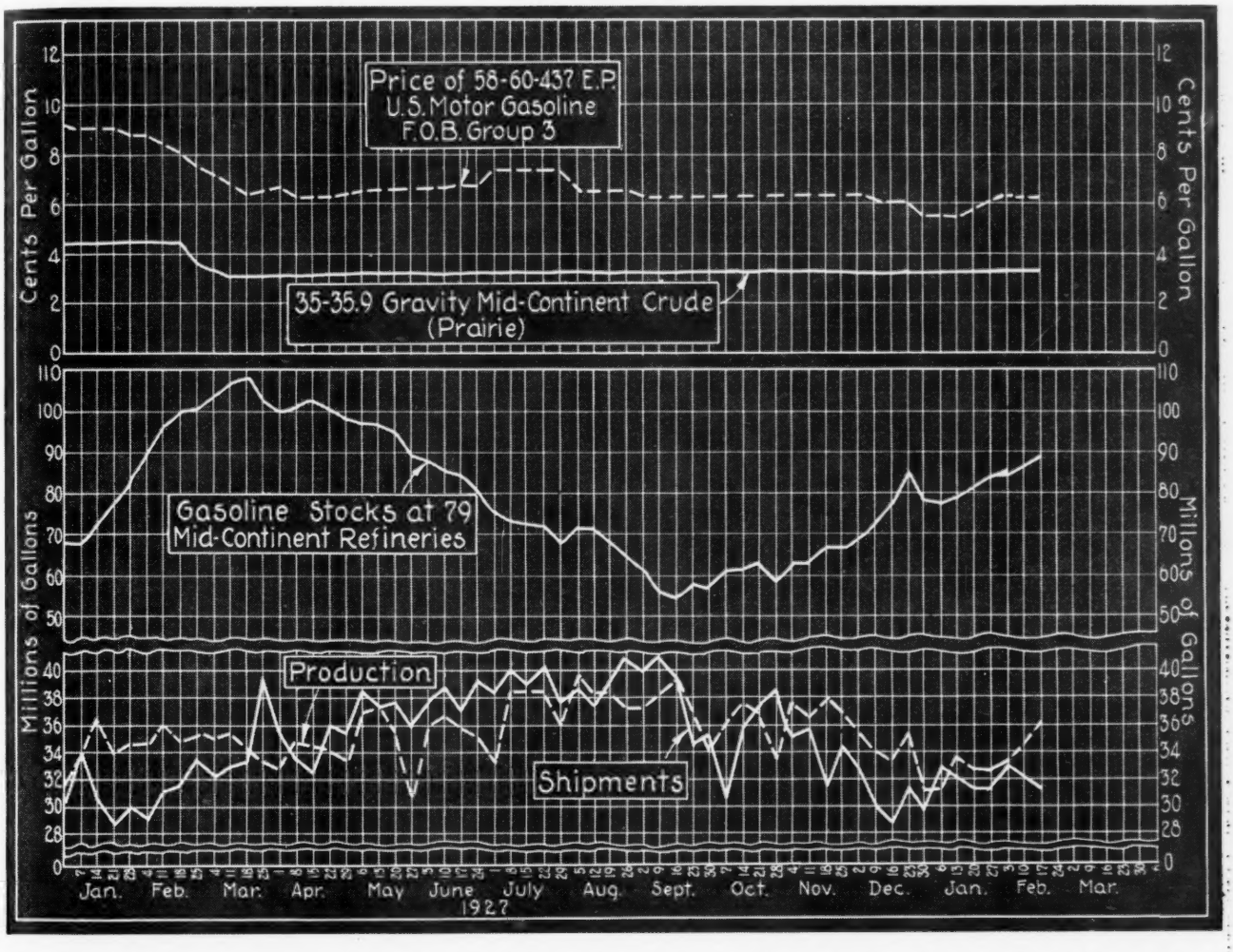
Production	24,288,000
Shipments	26,779,000
Net change in stocks	—2,491,000
Ratio sales to production	110.3%

Fuel Oil

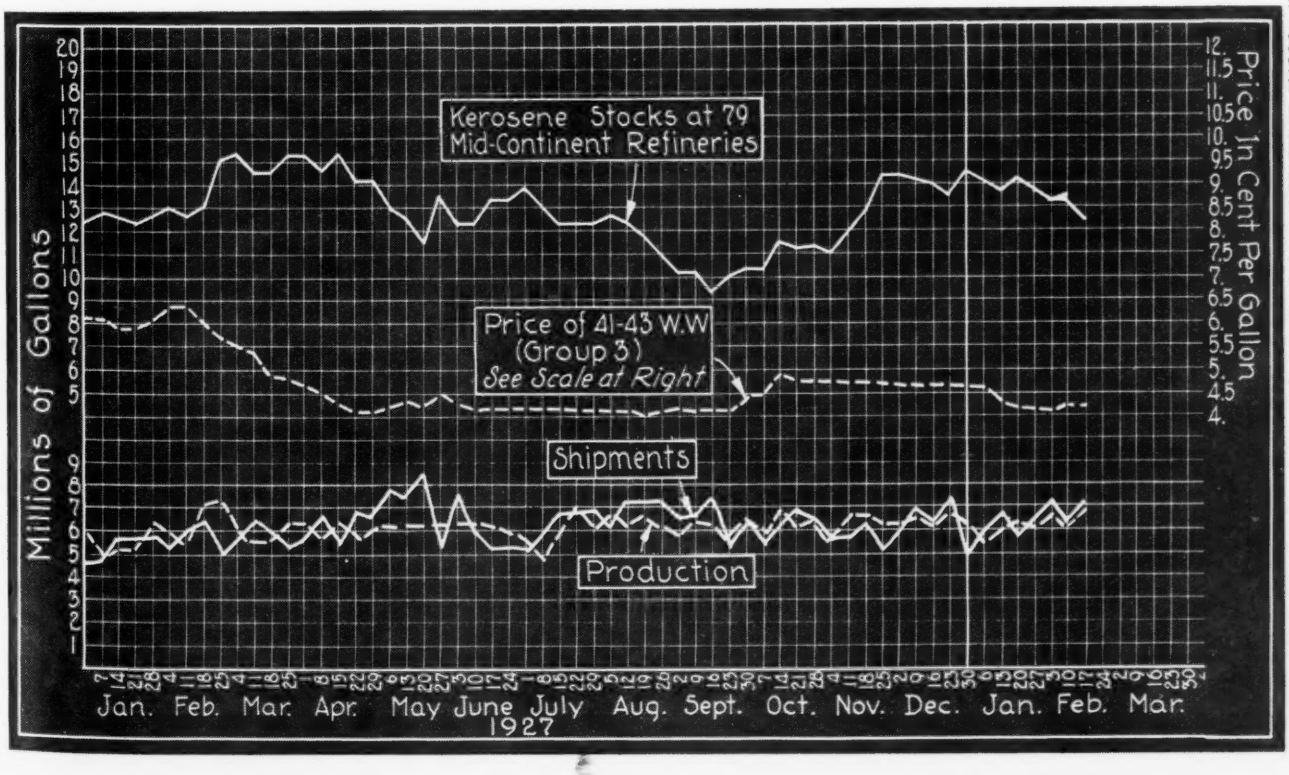
Production	108,729,000
Shipments	107,988,000
Net change in stocks	+741,000
Ratio sales to production	99.3%

Barometer of Mid-Continent Refinery Market—Week Ending February 17

Charted Course of Prices, Production, Shipments, Stocks of Principal Refined Products, Week by Week, From Reports Made by 79 Plants to National Petroleum News

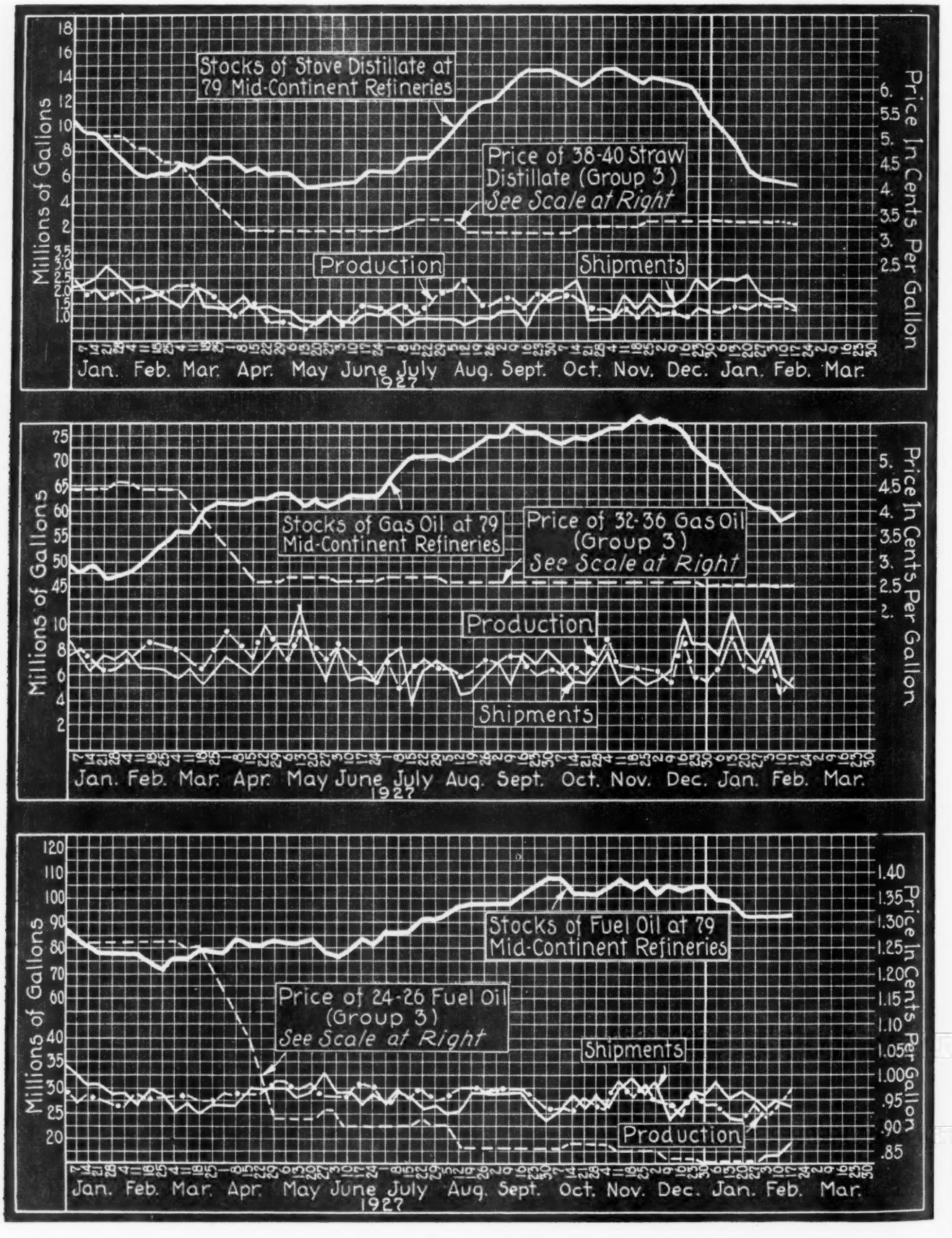

Price of 58-60-437 E.P. U.S. Motor Gasoline F.O.B. Group 3
35-35.9 Gravity Mid-Continent Crude (Prairie)
Cents Per Gallon
Gasoline Stocks at 79 Mid-Continent Refineries
Production
Shipments
Millions of Gallons
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1927

Prices shown above are extended to date shown in Refinery Market and Crude tables in Market section of this issue and stocks, shipments and Production are extended to date shown in table on opposite page

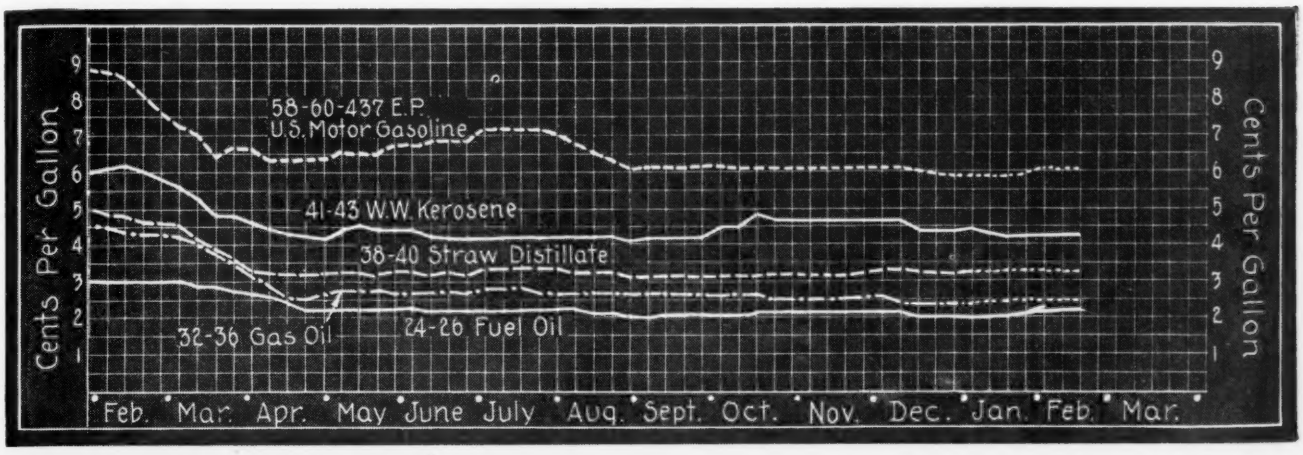

Kerosene Stocks at 79 Mid-Continent Refineries
Price of 41-43 W.W (Group 3) See Scale at Right
Shipments
Production
Millions of Gallons
Price In Cent Per Gallon
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1927

Barometer of Mid-Continent Refinery Market—Week Ending February 17

Charted Course of Prices, Production, Shipments, Stocks of Principal Refined Products, Week by Week, From Reports Made by 79 Plants to National Petroleum News


Stocks of Stove Distillate at 79 Mid-Continent Refineries
Price of 38-40 Straw Distillate (Group 3) See Scale at Right
Production
Shipments
Millions of Gallons
Price In Cents Per Gallon
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1927
Stocks of Gas Oil at 79 Mid-Continent Refineries
Price of 32-36 Gas Oil (Group 3) See Scale at Right
Production
Shipments
Millions of Gallons
Price In Cents Per Gallon
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1927
Stocks of Fuel Oil at 79 Mid-Continent Refineries
Price of 24-26 Fuel Oil (Group 3) See Scale at Right
Shipments
Production
Millions of Gallons
Price In Cents Per Gallon
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1927

Current Prices of Principal Mid-Continent Refined Products



Prices shown are on Group 3 basis and extended to date shown in Refinery Market Tables Section of this Issue

lons Feb. 10, an increase of 4,725,000 gallons, or 5.6 per cent. Feb. 18, 1927, total gasoline stocks at the same group of plants were 96,889,000 gallons.

In Oklahoma refineries gasoline shipments fell more than 2,000,000 gallons, or 13.4 per cent. Oklahoma gasoline stocks increased 2,250,000 gallons; Texas stocks 1,400,000 gallons; north Louisiana and Arkansas stocks 230,000 gallons and Kansas stocks 850,000 gallons.

Crude runs at all reporting plants were increased 14,536 barrels daily average to 277,634 barrels a day, an increase of 5.5 per cent. Charges of partly refined oils were increased 3,500 barrels daily average to 15,146 barrels a day.

Shipments of kerosene from all reporting plants increased 13.1 per cent to 7,150,000 gallons. Production was increased 11.5 per cent to 6,900,000 gallons. Stocks were lowered 250,000 gallons to 12,798,000 gallons. A year ago kerosene stocks were 13,028,000 gallons.

Both production and shipments of stove distillate were reduced, production by 19.8 per cent to 1,128,000 gallons and shipments by 15.4 per cent to 1,359,000 gallons. Stocks were down to 5,078,000 gallons Feb. 17. A year ago distillate stocks were 6,092,000 gallons.

Stocks of gas oil at all reporting plants were increased 1,000,000 gallons to 59,313,000 gallons.

Shipments of fuel oil were almost unchanged at 27,303,000 gallons for the whole field. The increase in crude runs brought production up 2,400,000 gallons, or 8.5 per cent, to 29,605,000 gallons. Stocks were increased 2,300,000 gallons to 3,366,000 gallons. A year ago fuel oil stocks at the same plants totaled only 73,978,000 gallons.

LOS ANGELES, Feb. 18.—George F. Getty, Inc. recently moved its offices from the Bartlett building to suite 1060 in the new Subway Terminal building.

Pennzoil Confirms Stock Purchase in Columbia

OIL CITY, Feb. 20.—Confirmation of the announcement made by Burt Zimmerman, vice president of the Columbia Refining Co., Cleveland, that the Pennzoil Co., had acquired a stock interest in Columbia Refining Co. was made this week by C. L. Suhr, president of the Pennzoil Co. The stock purchase was reported in NATIONAL PETROLEUM NEWS Feb. 15, page 32.

Approximately $800,000 will be expended during the year developing marketing facilities in northern Ohio. The Columbia Refining Co. will continue operating under its present name, and some Ohio units of Pennzoil will be merged with the Columbia.

The stock purchase was made by Pennzoil Co. as a means of profitably investing some surplus funds, Mr. Zimmerman had announced. W. H. Fiske, Toledo manager of Pennzoil service stations, will be transferred to Cleveland as manager of the Columbia lubricating department. Columbia Refining Co. officials will continue in their present capacities.

Weighted Average Prices Oklahoma Market

In line with National Petroleum News' new policy of carrying a weighted average price for the four more important Oklahoma gasolines in its market section, these weighted average prices, together with the number of cars of each grade sold, as of Monday, Feb. 20, are published below, the figures not being available for publication in the market refinery table in the latter part of this issue:

	Total Cars	Weighted Average
58-60 U. S. Motor, 437 e. p.	46	6.1440
60-62, 437 e. p.	31	6.5080
60-62, 400 e. p.	15	6.6500
64-66, 375 e. p.	6	7.0417

Note: Above prices are in cents per gallon, f.o.b. Oklahoma refinery, in tank car lots.

Pennzoil Acquires Sharon Jobber

SHARON, Pa., Feb. 18.—All properties of Roberts & White, jobbers of gasoline and oils here for the past 14 years, were acquired by the Pennzoil Co., Oil City, on Feb. 1.

R. S. Hunter, who was assistant to T. J. White, who actively managed the business of Roberts & White, has been appointed manager of the newly acquired properties of the Pennzoil at Sharon. Mr. Hunter has been in the manufacturing and sales end of the oil business for the past 15 years, and previous to his joining Roberts & White, was in charge of the Chicago office of the Warren Oil Co.

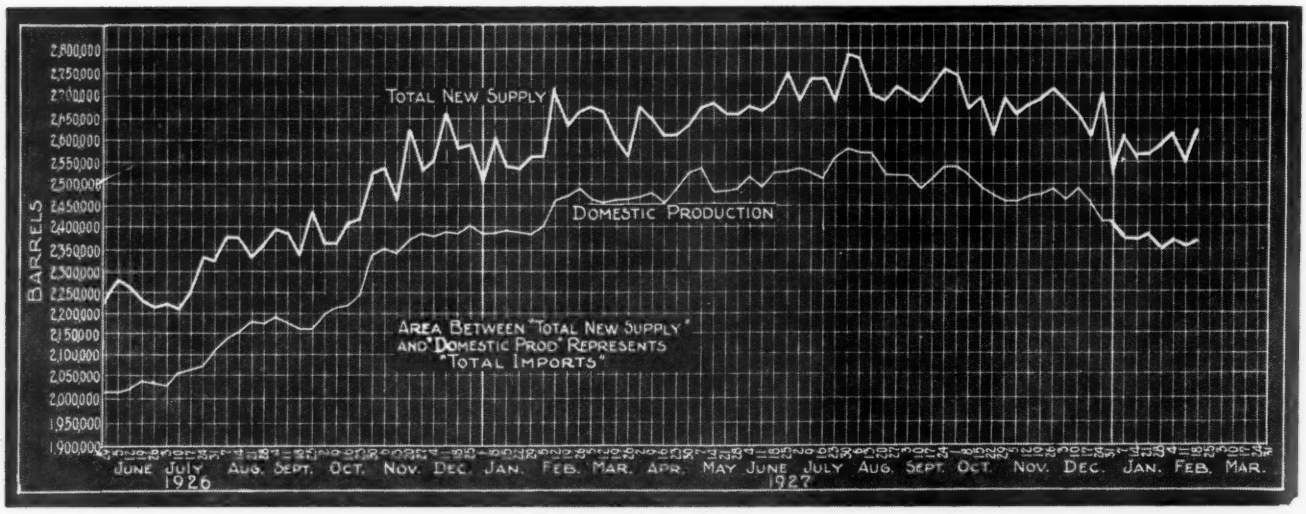
The deal included purchase of three service stations, bulk station and warehouse.

Eastern Kentucky Refinery Market

ASHLAND, Feb. 21.—Gasolines in eastern Kentucky refining district have advanced from ¼ to ⅜ cent per gallon during the past week, while all heavier oils are down ⅛ cent. Feb. 20 prices, f.o.b. eastern Kentucky refinery, are:

60-62, 425 e.p. gasoline	9.00
64-66, 375 e.p. gasoline	9.25
68-70, 360 e.p. gasoline	9.50
41-43 kerosene	6.25
34-36 gas oil	4.75
32-34 fuel oil	4.50
30-32 fuel oil	4.25
28-30 fuel oil	4.00
26-30 fuel oil	3.75
24-26 fuel oil	None available

Daily Average Crude Oil Production and Imports



Daily average gross output of United States, by fields, for week ending with dates below as compiled by American Petroleum Institute

PRODUCTION SUMMARY

	Feb. 18	Feb. 11
Production east of Rockies	1,746,000	1,744,800
Increase		1,200
Total production in U. S.	2,363,300	2,358,500
Increase		4,800
Crude oil imports	266,286	176,714
Increase		89,572
Total crude supply	2,629,586	2,535,214
Increase		94,372

OKLAHOMA

	Feb. 18	Feb. 11
North Braman	3,150	3,150
South Braman	1,800	1,950
Blackwell	3,800	3,800
Hubbard	3,000	3,100
Thomas	1,500	1,550
Tonkawa	15,800	15,400
Garber	9,950	9,950
Burbank	43,300	42,300
Osage, outside Burbank	29,550	29,600
Watchorn	1,000	1,150
Cushing	21,000	*21,000
Yale Jennings	8,950	8,950
Davenport	2,350	2,400
Bristow-Slick	24,900	24,550
North Okmulgee	15,850	15,850
Lyons-Deaner	7,700	7,800
Stroud	1,100	950
Cromwell	10,350	10,400
Papoose	5,350	5,300
Wewoka	8,450	8,200
Seminole	58,050	58,350
Bowlegs	92,900	92,700
Searight	18,800	18,800
Little River	34,150	34,700
Earlsboro	114,600	119,000
Duncan district	6,600	6,650
Graham	5,750	5,750
Fox	1,700	1,700
Healdton	14,400	14,400
Hewitt	8,800	8,900
Scholem Alechem	13,900	14,000
Others	79,600	78,450
Total Oklahoma	668,100	670,750
Decrease		2,650

KANSAS

	Feb. 18	Feb. 11
Greenwood County	30,000	30,000
Florence-Covert	1,450	1,450
Peabody-Elbing	3,750	3,800
Eldorado-Towanda	14,250	14,250
Augusta-Fox-Bush	4,200	4,250
Rainbow Bend	1,650	1,800
Russell	2,900	2,300
Churchill	12,350	12,500
Oxford	14,400	14,300
Others	25,000	25,000
Total, Kansas	109,950	109,650
Increase		300

NORTH LOUISIANA

	Feb. 18	Feb. 11
Homer	4,450	4,450
Haynesville	6,400	6,400
Caddo, light	11,550	11,850
Caddo, heavy	3,950	3,950
De Soto, Red River	4,300	4,250
Elm Grove	550	550
Bellevue	1,000	950
Cotton Valley	4,500	4,550
Urania	7,950	8,000
Pleasant Hill	700	700
Total, North Louisiana	45,350	45,650
Decrease		300

ARKANSAS

	Feb. 18	Feb. 11
El Dorado	5,150	5,050
Champagnolle	1,250	1,150
Smackover, light	8,550	8,600
Smackover, heavy	67,950	68,350
Stephens	1,100	1,050
Nevada	1,800	1,850
Lisbon	2,350	2,400
Others	100	100
Total, Arkansas	88,250	88,550
Decrease		300

TEXAS (Outside Gulf Coast)

Panhandle District

	Feb. 18	Feb. 11
Hutchinson County	46,800	50,400
Carson County	7,600	7,550
Gray County	20,800	22,050
Wheeler County	1,000	1,200
Others	50	50
Total, Panhandle District	76,250	81,250
Decrease		5,000

North Texas

	Feb. 18	Feb. 11
Burkburnett	12,550	12,100
Electra	11,250	10,750
Iowa Park and K-M-A	1,950	1,800
Wilbarger	10,100	10,050
Archer County	20,000	21,000
Montague-Cooke	12,950	14,000
Others	600	650
Total N. Texas	69,400	70,350
Decrease		950

West Central Texas

	Feb. 18	Feb. 11
Stephens County	7,500	7,150
Eastland-Desdemona	8,500	8,200
Brown County	13,000	14,000
Coleman County	1,500	1,000
Callahan County	3,900	3,800
Shackleford County	6,200	5,750
Young County	9,100	9,400
Throckmorton County	1,050	1,050
Palo Pinto County	500	500
Jack County	1,450	1,400
Others	500	500
Total, West Central Texas	53,200	52,750
Increase		450

West Texas

	Feb. 18	Feb. 11
Jones County	1,200	1,200
Mitchell and Scurry Counties	3,500	3,450
Howard County	5,200	6,900
Reagan County	20,500	21,100
Crane & Upton Counties	96,000	100,100
Crockett County	2,950	2,900
Pecos County	48,300	47,700
Winkler	115,600	96,600
Others	2,500	2,400
Tot., W. Texas	295,750	282,350
Increase		13,400

East Central Texas

	Feb. 18	Feb. 11
Mexia	7,600	7,750
Currie	500	600
Richland	500	600
Wortham	1,900	1,900
Corsicana-Powell	12,000	12,300
Nigger Creek	1,600	1,750
Total, East Central Texas	24,100	24,900
Decrease		800

Southwest Texas

	Feb. 18	Feb. 11
Luling	13,250	12,700
Lytton Springs	1,600	1,600
Somerset	800	800
Laredo District	6,400	6,200
Piedras Pintas	.....	.....
Dale	550	550
Others	400	400
Total, Southwest Texas	23,000	22,250
Increase		750
Total, Texas—(Outside Gulf Coast)	541,700	533,850
Increase		7,850

GULF COAST

Coastal Louisiana

	Feb. 18	Feb. 11
West Columbia	7,550	8,000
Damon Mound	900	900
Big Creek	1,900	1,950
Boling	1,950	2,100
Blue Ridge	4,500	5,100
Pierce Junction	8,750	8,800
Humble	1,600	1,600
Goose Creek	7,350	7,350
South Liberty	2,150	2,150
Hull	11,600	11,500
Saratoga	1,050	1,050
Batson	1,350	1,300
Barber's Hill	650	650
Sour Lake	3,650	3,500
Spindletop	36,600	37,900
Orange County	4,400	4,500
Others	3,000	3,350
Total, Coastal Texas	98,950	101,700
Decrease		2,750
Vinton	4,600	4,750
Lockport	4,750	4,900
Evangeline	1,150	1,000
Edgerly	1,750	1,700
Others	2,250	2,000
Total, Coastal Louisiana	14,500	14,350
Increase		150
Total Gulf Coast	113,450	116,050
Decrease		2,600

ROCKY MOUNTAIN

Wyoming

	Feb. 18	Feb. 11
Salt Creek	38,500	38,700
Grass Creek	2,500	2,450
Elk Basin	1,150	1,000
Big Muddy	2,750	2,700
Lost Soldier	2,750	2,800
Rock River	2,700	2,550
Lance Creek	650	650
Teapot Dome	.....	.....
Others	3,350	3,350
Total, Wyoming	54,350	54,200
Increase		150

Montana

	Feb. 18	Feb. 11
Cat Creek	1,800	1,800
Sunburst	8,500	8,500
Others	150	150
Total, Montana	10,450	10,450

Colorado

	Feb. 18	Feb. 11
Moffat (Craig)	1,300	1,250
Fort Collins	3,050	2,750
Florence	1,100	1,100
Others	2,050	2,050
Total, Colorado	7,500	7,150
Increase		350

New Mexico

	Feb. 18	Feb. 11
Table Mesa	350	.....
Artesia	1,250	1,250
Hogback	550	550
Rattlesnake	.....	500
	250	200
Tot., N. Mex.	2,400	2,500
Decrease		100
Tot., Rocky Mountain	74,700	74,300
Increase		400

California

	Feb. 18	Feb. 11
Santa Fe Springs	38,000	38,000
Long Beach	118,000	117,000
Huntington Beach	60,000	60,000
Torrance	19,800	20,000
Dominguez	12,800	13,000
Rosecrans	7,500	7,800
Inglewood	30,500	30,500
Midway-Sunset	79,500	79,500
Ventura Avenue	54,000	51,500
Seal Beach	39,800	40,000
Others	157,400	156,400
Total California	617,300	613,700
Increase		3,600

Eastern

	Feb. 18	Feb. 11
(Including Ill., Ind. Ky., O., W. Va., Pa., and N. Y.)	104,500	106,000
Decrease		1,500

*Revised.

Crude Price Cut Leads Operators to Talk Of Keeping Drilling Restrictions

By Lawrence E. Smith
N. P. N. STAFF WRITER

TULSA, Feb. 18

CHIEF of the week's developments in the Mid-Continent territory was the reduction in crude oil price posted Feb. 16 by the Magnolia Petroleum Co. It applied to the low ends of the gravity scale in Oklahoma, Kansas and Texas fields. Oil of 30 gravity and below was posted at 75 cents, a cut of 30 cents; 30-30.9 posted at 90 cents, a cut of 26 cents and 31-31.9 posted at $1.05, cut of 13 cents.

Various and devious explanations were advanced for the move, but it probably is all quite simple. Magnolia was getting too much low gravity oil at the former price, considering the amount of oil that it is getting and can get in West Texas and furthermore considering the state of the fuel oil market. Up to today no other purchaser had met the reduction.

The cut served two purposes, first, to lay in cold storage for a few minutes, at least, the talk of advance in price and, second, to cause some speculation as to whether the restrictions on part of the Seminole district should be abated March 1.

Immediately south of the Little River field, the transportation departments of a number of companies have been quite busy the past week moving in material, in anticipation of the drilling campaign scheduled to get under way March 1. The operators' agreement is to end, so far as the Little River territory is concerned, on that date. For the rest of the shut-in fields it runs to April 1.

A general meeting of operators is to be held Feb. 21 and it is understood some of them are prepared to recommend another month of the restrictive policy on the Little River south field. The situation in that area is acute, for several companies have been suffering drainage and taking their medicine nobly for the good of the cause.

THE Magnolia cut brought the subject to the top of the heap, however, and a number of people are convinced that every well that can be stopped before it starts will be that much gain. Magnolia's cut, it is true, does not affect the Seminole grade of oil, being confined in Oklahoma to such fields as Fox, Milroy, Graham, Healdton, Hewitt, Robberson, Duncan and Sholem Alechem, all in southern Oklahoma, and to a few small fields in Texas and a little in Kansas. Overproduction of any grade, however, will affect the entire structure in time and this is just as true now as it ever was.

Field developments in the Mid-Continent were mainly routine in character during the week. A surprise was staged for the industry when the south offset to Prairie Oil & Gas Co.'s big Davis well, in the southeast of Earlsboro field, was drilled in. The Prairie well had a high production of 7,400 barrels and is still making better than 6,000. Carter's offset, in the NE SW NW of 13-29-5, topped the Wilcox at 4362 feet, 25 feet lower than the Prairie's well. It was drilled to total depth of 4368 feet, shot with 20 quarts and the best it has done to date was 500 barrels on the swab. Carter is now hooking it up for air lift. What radical change there was in the sand character in the 660 foot interval between the wells is difficult to guess. Anyway, it spoils for the time the theory of a big extension to the field.

The Twp. 7-3 and 7-4 territory, southwest of the Seminole district, is quite active now. Hunton lime production has been obtained for many months. Recently the Indian Territory Illuminating Oil Co. drilled in its No. 1 Sullivan in the SW NW SE of 25-7-3, getting production in the Viola lime. The well is now making 1500 barrels. The offset, drilled in prior to the I. T. I. O.'s completion,

Drilling Operations in Oklahoma, Kansas and Texas, Week Ended February 18, 1928

	February 18 Loc.	Rigs	Drg.	S.D.	Week Ended Total	February 11 Loc.	Rigs	Drg.	S.D.	Total
OKLAHOMA										
Burbank	..	5	37	2	44	..	6	43	..	49
Other Osage	2	4	25	1	32	2	6	23	1	32
Bristow-Cushing	4	7	39	9	59	4	10	39	8	61
North Oklahoma	9	10	74	32	125	13	8	75	36	132
South Oklahoma	7	18	123	30	178	8	19	120	35	182
Muskogee	..	6	44	18	68	..	8	43	19	70
Okmulgee-Bristow	13	32	76	18	139	11	36	70	16	133
Seminole Dist.	11	30	146	19	206	11	28	153	16	208
Total Oklahoma	46	112	564	129	851	49	121	566	131	867
KANSAS	32	52	134	62	280	32	63	58	125	278

	February 18 Loc.	Rigs	Drg.	S.D.	Week Ended Total	February 11 Loc.	Rigs	Drg	S.D.	Total
TEXAS										
Central	..	137	210	134	481	..	114	219	118	451
Panhandle	..	64	109	62	235	..	79	89	68	236
N. Central	..	47	84	29	160	..	52	80	33	165
West	..	109	221	135	465	..	107	207	149	463
Laredo	..	1	25	19	45	..	1	25	19	45
Total Texas	..	358	649	379	1,396	..	353	620	387	1,360
New Mexico	..	2	18	26	46	..	2	14	26	42
GRAND TOTAL	78	524	1,365	596	2,563	81	539	1,258	669	2,547

Completions in North Louisiana and Arkansas, Week Ended February 16, 1928

Company	Well	Location	Depth	Yield
Lousiana—Caddo Parish—Pine Island				
Ark. Nat. Gas Co.	C. W. Lane No. 1	13-21-15	4101	junked, aband.
Ohio Oil Co.	E. K. Smith No. 25	12-21-15	4369	salt water, aband.
Bossier Parish—Bellevue				
Louisiana Oil Ref. Corp.	Bodcaw Fee D-32	15-19-11	435	salt water, aband.
DeSoto Parish—Naborton				
J. H. Askew	Richardson No. 3	25-13-11	2551	40 bbls.
Ouachita Parish				
J. M. Huber	Edwards No. 4	1-18-4E	2210	7M ft. gas
Southern Car. Co.	Phillips No. 3	3-19-4E	2170	10M ft. gas
Richland Parish				
Moody & Seagraves	Hemler C-1	21-16-6E	2503	57 M ft. gas
Moody & Seagraves	Lafleur No. 1	18-16-6E	2465	55 M ft. gas

Company	Well	Location	Depth	Yield
East Texas—Harrison County—Waskom				
D. M. Lide et al.	A. Abercrombie No. 1	Bedford HRS	1890	5M ft. gas
State Line O. & G. Co.	Z. Abney No. 4	W. R. Andrews HRS	956	4M ft. gas
Panola County				
S. H. Gardner et al.	Roquemore No. 3	B. C. Jordan HRS	2285	4M ft. gas
Magnolia Pet. Co.	Sol Oden No. 2	B. C. Jordan HRS	2348	2M ft. gas
Natural Gas & Prod. Co.	T. C. Adams No. 1	Evans Bracken HRS	955	5 M ft. gas

Seminole District Production by Companies and Leases, February 17 and February 10, 1928

BOWLEGS

Company	Farm	S.T.R.	Feb. 17th Wells	Feb. 17th Prod.	Feb. 10th Wells	Feb. 10th Prod.
Amerada	Rascoe	15- 8-6	8	2,810	8	2,730
Atlantic	Baker	1- 8-6	4	689	4	600
Atlantic	Fleet	23- 8-6	4	632	4	430
Atlantic	Grayson	21- 8-6	3	1,069	3	1,168
Atlantic	A. Jones	10- 8-6	3	120	3	69
Atlantic	C. Jones	9- 8-6	2	357	2	229
Total Atlantic			16	2,967	16	2,496
Barnsdall	McNac	28- 8-6	1	30	1	33
Barnsdall	Murrow	11- 8-6	4	880	4	908
Total Barnsdall			5	910	5	941
Carter	Bowlegs	15- 8-6	4	1,[illegible]5	4	1,275
Carter	Burden	23- 8-6	3	3[illegible]	3	365
Carter	Jarjoche	15- 8-6	6	715	6	800
Carter	Hilly	23- 8-6	3	1,0[illegible]	3	1,115
Carter	Jones	11- 8-6	4	1,780	4	1,750
Carter	McGeisey	21- 8-6	1	50	1	35
Carter	Melisse	9- 8-6	1	800	1	540
Carter	Walker	15- 8-6	4	735	4	740
Carter	Wise	23- 8-6	12	4,000	12	4,175
Total Carter			34	10,460	34	10,795
Empire	Lacey	15- 8-6	6	[illegible]	6	670
Empire	Wise	23- 8-6	2	632	2	680
Total Empire			8	1,315	8	1,350
Gypsy	Bowlegs	22- 8-6	1	0	1	0
Gypsy	Bradley	8- 8-6	1	10	1	10
Gypsy	Cumsey	8- 8-6	4	1,877	4	1,525
Gypsy	Dosar	7- 8-6	1	100	1	100
Gypsy	Grayson	13- 8-6	4	705	4	725
Gypsy	Harjoche	10- 8-6	1	830	1	800
Gypsy	Henderson		1	510	0	0
Gypsy	Jones	11- 8-6	1	345	1	397
Gypsy	Walker	15- 8-6	8	2,339	8	2,142
Gypsy	Wise	23- 8-6	3	377	3	227
Total Gypsy			25	7,173	2[illegible]	5,926
I. T. I. O.	Barnett-A	24- 8-6	2	334	1	387
I. T. I. O.	Barnett-B	24- 8-6	2	242	2	258
I. T. I. O.	Billington	22- 8-6	5	969	5	866
I. T. I. O.	Bowlegs	22- 8-6	11	1,601	11	1,645
I. T. I. O.	Davis	13- 8-6	4	1,518	4	1,420
I. T. I. O.	Fay	18- 8-6	9	2,803	9	2,775
I. T. I. O.	Goforth	15- 8-6	11	1,569	11	1,743
I. T. I. O.	Livingston	15- 8-6	11	4,083	11	3,059
I. T. I. O.	Lizzie	11- 8-6	2	611	2	647
I. T. I. O.	Walker	15- 8-6	8	1,003	8	1,098
I. T. I. O.	Wilmont	15- 8-6	4	907	4	882
I. T. I. O.	Work		1	145	1	135
I. T. I. O.	Youngblood	22- 8-6	2	215	2	140
Total I. T. I. O.			72		71	15,056
McCulloch	Bowlegs	22- 8-6	3	370	3	355
Magnolia	Davis-BF	13- 8-6	1	802	1	787
Magnolia	Davis-M	13- 8-6	1	335	1	371
Magnolia	Hammond	10- 8-6	2	140	2	136
Magnolia	Rhodes	10- 8-6	8	5,413	8	5,118
Magnolia	Van Buskirk	9- 8-6	1	315	1	307
Total Magnolia			13	6,849	13	6,719
Mid-Continent	Baker	10- 8-6	4	1,798	4	1,861
Mid-Continent	Bowlegs	22- 8-6	1	25	1	0
Mid-Continent	Smith	12- 8-6	6	755	6	780
Total Mid-Continent			12	2,579	12	2,641
Minnehoma	Bowlegs	15- 8-6	3	200	3	157
Prairie	Gahagan	23- 8-6	4	680	4	670
Prairie	Harber	10- 8-6	8	3,865	8	4,615
Prairie	Jones	11- 8-6	4	533	4	750
Prairie	Templeton	12- 8-6	4	3,180	4	3,475
Prairie	Whitney	23- 8-6	4	555	4	160
Total Prairie			24	8,835	24	8,670
Pure	Reed	14- 8-6	15	3,479	15	4,690
Pure	Strother-D	14- 8-6	4	729	4	787
Pure	Strother-F	10- 8-6	3	580	3	1,408
Total Pure			22	4,788	22	5,883
Roxana	Taylor	16- 8-6	6	1,492	6	1,365
Shaffer	Lacey	14 -8-6	3	565	3	442
Sinclair	Bowlegs	22- 8-6	1	55	1	60
Sinclair	Cumsey	10- 8-6	4	5,817	4	6,446
Sinclair	Ellen	11- 8-6	6	1,664	6	1,695
Sinclair	Harjo	14- 8-6	3	885	3	790
Sinclair	Jones	8- 8-6	6	4,715	6	6,576
Sinclair	Taylor	10- 8-6	4	3,189	4	3,307
Sinclair	Walker-M&W	22- 8-6	5	2,669	4	845
Total Sinclair			29	18,994	28	19,719
Texas	Reed	14- 8-6	11	3,285	10	3,520
Tidal	Grayson	13- 8-6	3	1,165	3	1,220
Tidal	Harjoche	10- 8-6	6	2,630	6	3,040
Total Tidal			9	3,795	9	4,260
Twin State	Jones	10- 8-6	2	5	2	17
TOTAL BOWLEGS			308	92,649	307	93,043

LITTLE RIVER

Amerada	Fore	35- 8-6	2	1,025	2	1,065
Amerada	Nitey	35- 8-6	3	2,925	3	2,750
Total Amerada			5	3,950	5	3,815
Barnsdall	Hotulke		1	55	1	60
Blackwell	Nitey	35- 8-6	7	2,911	8	3,668
Carter	Fish	1- 7-6	5	1,905	4	1,365
Carter	Jackson	11- 8-6	1	100	1	100
Total Carter			6	2,005	5	1,465
Continental	Cosar	2- 7-6	2	875	2	755
Gypsy	Brown	33- 8-6	1	50	1	50
Gypsy	Campbell	36- 8-6	2	190	2	222
Gypsy	Nungee	1- 8-6	1	45	1	12
Gypsy	Pottey	35- 8-6	3	572	3	455
Total Gypsy			7	857	7	739
Independent	Harris	23- 7-6	1	104	1	104
Independent et al	Davis	2- 7-6	1	2,020	1	2,205
Total Independent			2	2,124	2	2,309
I. T. I. O.	Campbell	1- 7-6	1	152	1	154
I. T. I. O.	Dungan	35- 8-6	3	2,663	3	2,803
I. T. I. O.	House-MA	1- 7-6	1	217	1	258
I. T. I. O.	A-House-WE	1- 7-6	1	38	1	64
I. T. I. O.	B-House-WE	2- 7-6	3	1,700	3	1,791
I. T. I. O.	Jackson	1- 7-6	3	2,227	3	2,254
I. T. I. O.	McCulla	1- 7-6	3	1,026	3	1,044
I. T. I. O.	Nitey	2- 7-6	7	1,537	7	1,688
I. T. I. O.	Phoebe-A	36- 8-6	3	790	3	823
I. T. I. O.	Phoebe-B	36- 8-6	3	447	3	435
I. T. I. O.	Reed	1- 7-6	1	46	1	108
I. T. I. O.	Hull	26- 8-6	1	124	1	125
I. T. I. O.	Sotkneche	1- 7-6	4	1,016	4	1,031
Total I. T. I. O.			34	11,938	34	12,578
Magnolia	Cruse	2- 7-6	1	720	1	755
Magnolia	Pottey	35- 8-6	2	512	2	518
Total Magnolia			3	1,232	3	1,273
Mid-Continent	Wadsworth	26- 8-6	7	1,080	7	1,060
Mid-Continent	Smith	12- 8-6	1	40	1	40
Total Mid-Continent			8	1,120	8	1,140
Pine et al	Pottey	35- 8-6	2	1,043	2	970
P & R	Dungan	35- 8-6	2	120	2	135
P & R	House	2- 7-6	4	2,215	4	1,275
Total P & R			6	2,335	6	1,410
Roxana	Smith	1- 7-6	1	10	1	12
Shaffer	Narcome	35- 8-6	0	0	1	15
Sinclair	Cosar	36- 8-6	2	1,630	1	1,140
Snowden et al	Tiger	13- 7-6	1	87	1	180
Superior	Wadsworth	1- 7-6	1	18	1	20
Texas	Coker	1- 7-6	3	625	3	620
Tidal	House	1- 7-6	3	1,575	3	1,715
Tidal	Johnson	1- 7-6	1	75	1	75
Total Tidal			4	1,650	4	1,790
TOTAL LITTLE RIVER			97	34,514	95	33,904

EARLSBORO

Amerada	Anderson	15- 8-6	3	1,165	2	1,495
Amerada	Cowden	4- 9-5	8	2,085	8	2,020
Amerada	Rodgers	3- 9-5	3	1,835	3	2,000
Total Amerada			14	5,085	13	5,515
Barnsdall	Brown	10- 9-5	4	1,946	4	2,113
Barnsdall	Bruner-F	2- 9-5	2	1,001	2	668
Barnsdall	Bruner-N	11- 9-5	4	1,478	4	1,314
Barnsdall	Cudjo	11- 9-5	1	27	1	26
Barnsdall	Davis-D	11- 9-5	3	1,685	3	1,790
Barnsdall	Davis-J	11- 9-5	4	817	4	1,332
Barnsdall	Davis-M	11- 9-5	3	145	3	171
Barnsdall	Gibson	9- 9-5	8	2,097	8	2,629
Barnsdall	Hearn	15- 9-5	1	5	1	6
Barnsdall	Ingram	4- 9-5	7	5,893	7	4,939
Barnsdall	Pack	10- 9-5	4	191	4	178
Barnsdall	Peter	10- 9-5	4	461	4	348
Barnsdall	Sango	2- 9-5	3	7,041	3	6,835
Barnsdall	Sebolka	15- 9-5	1	799	1	854
Barnsdall	Sullivan-H	11- 9-5	2	0	2	0
Barnsdall	Sullivan	10- 9-5	2	30	2	74
Barnsdall	Watsutke	12- 9-5	4	1,259	4	1,652
Total Barnsdall			57	24,875	57	25,029
Carter	Davis	13- 9-5	1	40	1	85
Carter	Payne	12- 9-5	3	175	3	180
Carter	Sango	2- 9-5	4	3,005	4	3,450
Total Carter			8	4,220	8	3,715
Continental	Kays	2- 9-5	2	405	2	360
Continental	Spencer	12- 9-5	4	1,290	4	1,330
Total Continental			6	1,695	6	1,690
Empire	Barker	12- 9-5	1	1,722	1	2,006
Empire	Edmundson	3- 9-5	3	1,207	3	1,240
Total Empire			4	2,929	4	3,246
Gypsy	Bruner	10- 9-5	4	2,062	4	15
Gypsy	Carter	11- 9-5	10	3,980	10	3,455
Gypsy	Earl	16- 9-5	1	20	1	4,167
Gypsy	Hunick	5- 9-5	1	2,265	1	15
Gypsy	McFarland		1	12	1	800
Gypsy	Noble	12- 9-5	4	4,105	4	4,260
Gypsy	Peter	10- 9-5	6	225	6	180
Gypsy	Sango	1- 9-5	5	4,907	5	5,395
Gypsy	State	16- 9-5	4	1,257	4	1,405
Total Gypsy			36	18,833	36	19,677
Independent	Bruner	10- 9-5	4	165	4	90
Independent	Gaines	11- 9-5	4	1,380	4	1,110
Independent	Knapp	8- 9-5	6	2,440	5	2,535
Independent	O'Dell	4- 9-5	4	0	4	15
Independent	Sullivan	10- 9-5	4	107	4	248
Total Independent			22	4,092	21	3,998
Magnolia	Bryant	9- 9-5	6	1,987	6	2,270
Magnolia	Cowden	4- 9-5	4	56	4	95
Magnolia	Dixon		1	0	1	17

(*Continued on Page 43*)

Seminole District Production by Companies and Leases, February 17 and February 10, 1928

(*Continued from Page 42*)

Company	Farm	S.T.R.	Feb. 17th Wells	Feb. 17th Prod.	Feb. 10th Wells	Feb. 10th Prod.
Magnolia	Edmundson	3- 9-5	3	42	3	38
Magnolia	Holmsley	11- 9-5	8	2,194	8	2,659
Magnolia	Ingram	10- 9-5	1	30	1	30
Magnolia	Lena	10- 9-5	3	83	3	84
Magnolia	Seay	12- 9-5	9	5,602	9	5,878
Magnolia	Simpson	10- 9-5	4	294	4	320
Magnolia	Sparks	11- 9-5	7	2,837	7	2,513
Magnolia	Sullivan	12- 9-5	3	129	3	113
Total Magnolia			51	13,254	51	14,017
Mid-Continent	McCumber	9- 9-5	7	385	7	430
Mid-Kansas	Anderson	14- 9-5	4	225	4	315
Phillips	Dunnaway	15- 9-6	1	45	1	32
Phillips	Graham	9- 9-5	4	227	7	192
Total Phillips			5	272	8	224
Prairie	Baker	23- 9-5	1	50	1	50
Prairie	Davis	13- 9-5	4	6,735	4	7,955
Prairie	Graham-C	3- 9-5	2	25	2	0
Prairie	Graham-O	10- 9-5	4	1,660	4	1,885
Prairie	Stidham	11- 9-5	13	4,180	13	3,925
Total Prairie			24	12,650	24	13,815
Roxana	Bayliss	17- 9-5	1	14	1	15
Roxana	Spencer	12- 9-5	2	2,051	2	1,780
Total Roxana			3	2,065	3	1,795
Shaffer	Clark	1- 9-5	5	1,102	1	1,040
Sinclair	Foreman	18- 9-5	1	15	1	15
Sinclair	Hollins	12- 9-5	3	215	3	245
Sinclair	Sango	2- 9-5	2	4,505	3	4,870
Total Sinclair			6	4,735	7	5,130
Skelly	Spencer	12- 9-5	1	730	1	738
Texas	Anderson	2- 9-5	6	715	6	1,072
Texas	Brown	10- 9-5	8	2,565	8	2,710
Texas	Rodgers	5- 9-5	4	4,705	4	4,965
Texas	Wilmont	10- 9-5	6	3,325	6	3,315
Total Texas			24	11,310	24	12,062
Tidal	Watkins	9- 9-5	8	2,895	8	2,950
Twin State	Barker	12- 9-5	3	135	3	100
Twin State	Hearn	2- 9-5	4	3,045	4	3,030
Total Twin State.			7	3,180	7	3,130
TOTAL EARLSBORO			289	113,585	290	118,432
TOTAL LITTLE RIVER			97	34,514	95	33,904
TOTAL SEARIGHT			71	18,994	71	18,719
TOTAL BOWLEGS			308	92,649	307	93,043
TOTAL SEMINOLE			314	57,093	318	58,484
GRAND TOTAL SEMINOLE AREAS			1,081	316,835	1,083	322,582
Avg. Per Well				292		298

Completions in Oklahoma and Kansas, Week Ended February 18, 1928

OKLAHOMA

Beckham County

Company	Well No.	Location	Depth	Init. Prod.
Prince et al	1	C SW NW 5-8-23 W	T.D. 3003	Dry

Caddo County

Company	Well No.	Location	Depth	Init. Prod.
English	3	NWc SE 5-5-9 W	2086-2420	70

Carter County

Company	Well No.	Location	Depth	Init. Prod.
Schermerhorn et al.	1	NEc NW SW 23-1-3 W	2307-2310	265

Cotton County

Company	Well No.	Location	Depth	Init. Prod.
Jenkins et al	2	SWc SE SE 34-1-10 W	2175-2184	25

Comanche County

Company	Well No.	Location	Depth	Init. Prod.
Danciger	1	NEc SE 10-2-10 W	2203	Dry

Grady County

Company	Well No.	Location	Depth	Init. Prod.
Franklin	1	SEc NE SE 17-3-5 W	T.D. 2776	Dry
Meridian	4	NEc SE 23-5-8 W	1998-2040	5½M
Okla. Gas	2	NEc NW 2-4-8 W	2120-2400	60M

Creek County

Company	Well No.	Location	Depth	Init. Prod.
Olean	4	NWc NE NE 36-15-7	3329-3344	15½M
Skelly et al	1	SEc NE 24-17-9 E	2120-2155	300
Summitt	1	NEc SE NW 14-16-11	2381-2389	60
Bu-Vi-Bar	1	SEc SW 3-15-8 E	T.D. 3869	Dry
Kennedy et al	2	C NE NW 25-18-11	2454 OWD	Dry
Spears	7	SEc NE NW 11-17-12	T.D. 2117	Dry
Paraffin	2	SWc SE NW 26-16-11	T.D. 2825	Dry

Jefferson County

Company	Well No.	Location	Depth	Init. Prod.
Beck et al	1	SWc SE SW 34-6-5 W	1332-1337	20

Kay County

Company	Well No.	Location	Depth	Init. Prod.
Industrial	3	NEc NW SW 36-28-1 W	665-670	2M
Morgan	1-Elder	NWc SW 29-28-1 E	T.D. 1160	15M
Harris-Haun	1	C SW SE 20-20-1 E	T.D. 615	Dry
Industrial	1	C SE NE 28-27-1 W	T.D. 832	Dry

Logan County

Company	Well No.	Location	Depth	Init. Prod.
Marland	1	SWc NE 16-18-4 W	3984-4001	413&4M

Muskogee County

Company	Well No.	Location	Depth	Init. Prod.
Hale-Ford	2	SEc SW NW SE 6-14-19 E	512-522	180
Bryan-Emory	1	NWc SW NW SW 9-15-15 E	T.D. 1665	Dry

Okmulgee County

Company	Well No.	Location	Depth	Init. Prod.
Powell	1	NEc SE NE 20-14-15 E	T.D. 1453	Dry
Papoose	2	SWc SE 25-16-13 E	T.D. 2369	Dry
McBrayer et al	2	SWc NW 9-15-14 E	1623-1833	8M
Wallace	6	CWL NW SE 14-14-14	1667-1681	1½M
Shepherd et al	1	NWc NE NW 20-12-13	2410-2420	10

Osage County

Company	Well No.	Location	Depth	Init. Prod.
Kewanee	2	SWc SE NE 28-27-6 E	2893-2972	705
Kewanee	5	NEc SW NE 28-27-6	2874-2969	1500
Kewanee	6	NEc SW SE 34-27-6	2803-2867	230
Lewis	1	NWc SW 2-26-6	2806-2880	861
Lewis	2	SWc NW SW 2-26-6	2846-2913	1800
Peters	2	NWc SW 26-25-9	3131-3165	200
Peters	2	NEc NW SW 26-25-9	2104-2150	762
Tidal	3	SEc SW SE SE 28-21-10	1515-1535	25
Devonian	4	NWc NE NE 33-21-10	1512-1526	30
Prairie	1	NWc SE 19-23-7 E	T.D. 3221	Dry

Pontotoc County

Company	Well No.	Location	Depth	Init. Prod.
Conservative	1	NWc NE 28-5-6 E	T.D. 3520	Dry
La. O & R	7	NWc SW SW 17-5-8 E	2601-2627	250&20M
Homaokla	1	SEc NE SE 19-5-8	2482-2540	655

Pottawatomie County

Company	Well No.	Location	Depth	Init. Prod.
I. T. I. O.	1	SWc NW SE 25-7-3	4204-4213	3030
Indep. et al	2	NWc 14-7-4	3651-3800	100
Magnolia	2	SEc SW NW 19-7-4	3891-3912	140

Rogers County

Company	Well No.	Location	Depth	Init. Prod.
Skelly et al	1	NEc 19-22-17 E	T.D. 735	Dry
Creo	1	SEc SW NW 25-21-17	T.D. 510	Dry
Ingram	1	NEc SW 26-21-17	T.D. 538	Dry
Skelly et al	1	CSL SE SE 3-21-17	T.D. 585	Dry

Seminole County

Company	Well No.	Location	Depth	Init. Prod.
I .T. I. O.	6	NWc SE SW 13-8-6	T.D. 4385	Dry
Empire	8	NWc SW SW 14-8-6	T.D. 4260	Dry
Amerada	4	NEc SE SE 3-9-5 E	T.D. 4020	Dry
Sinclair et al	1	NWc SW 5-7-7 E	T.D. 4532	Dry
Mid-Cont	4	SEc SW SW 33-10-6	4460-4468	900
Magnolia	10	NWc SW 12-9-5	4255-4268	484
Twin State	3	SEc NE SE 11-8-6	4205-4210	125
Carter	3	SEc SW SE 15-8-6	4440-4465	95
Prairie	5	SEc NW NW 13-9-5	4337-4347	5000
Prairie	5	SEc SE 12-8-6	4395-4411	3000

Stephens County

Company	Well No.	Location	Depth	Init. Prod.
Medlin et al	1	NWc NE 34-1-8 W	1682-1689 OWD	180
Magnolia	3	SWc SE SW 29-1-8 W	T.D. 2510	Dry

Wagoner County

Company	Well No.	Location	Depth	Init. Prod.
Cane et al	1	CSL NE SE 35-17-17 E	885-892	8M
Elk	1	NEc 23-18-15	T.D. 1040	Dry
Commercial	4	SWc NW NW 6-16-15 E	T.D. 1568	Dry

KANSAS

Butler County

Company	Well No.	Location	Depth	Init. Prod.
Paul et al	1	NEc SW NE 31-26-6 E	T.D. 3175	Dry

Coffey County

Company	Well No.	Location	Depth	Init. Prod.
Garland et al	1	NWc SE 9-22-15 E	T.D. 1650	Dry

Cowley County

Company	Well No.	Location	Depth	Init. Prod.
Trees	2	SEc SW NE 30-30-4 E	T.D. 2903	Dry
Roth-Faurot	1	C SW SW 12-33-5 E	T.D. 717	Dry
Pryor-Lockhart	1	NEc NW SE 31-34-7 E	T.D. 3464	Dry
Roth-Faurot	1	L. 1-B-11, 22-32-4-E	2909-2917	3M

Elk County

Company	Well No.	Location	Depth	Init. Prod.
Elk	1	NEc SE 4-30-9 E	2305-2328	200
Hood et al	2	C NL SE SE 9-31-10	2008-2014	10

Geary County

Company	Well No.	Location	Depth	Init. Prod.
Brinkley et al	1	NEc NW NE 16-10-5 E	T.D. 2501	Dry

Greenwood County

Company	Well No.	Location	Depth	Init. Prod.
Transcontinental	2	SEc NE NE 10-22-10 E	T.D. 2197	Dry
Prairie	1	SEc NE SE 9-25-13 E	T.D. 1600	Dry
Darby	5	NEc SW NW 30-22-13	1681-1742	375
Christy et al	1	SWc NW 31-24-13 E	1665-1688	10
Rogers et al	1	NEc 3-26-10 E	1960-1965	30
Mohawk	1	SEc NW NE 7-27-11	1911-1912	20

Rooks County

Company	Well No.	Location	Depth	Init. Prod.
Derby	1	NEc NW NE 3-10-16 W	3075-3141	35

Saline County

Company	Well No.	Location	Depth	Init. Prod.
Mentor	1	SWc 17-15-2 W	T.D. 3501	Dry

Sumner County

Company	Well No.	Location	Depth	Init. Prod.
Roxana	4	SWc NE NW 36-31-2 E	1840-1901	689
Mead et al	1	Tract 5-14-32-2 E	2008-2090	288
Palmer et al	1	NEc NW 23-32-2 E	1285-1305	50

Wabaunsee County

Company	Well No.	Location	Depth	Init. Prod.
Empire	1	SEc 19-12-11 E	T.D. 3438	Dry

died. It has been revived for about 1100 barrels daily. Viola lime production is a rarity anywhere and there is no great enthusiasm as to its possibilities in that area, but the wells call for considerable new work. In 25-7-4, Mid-Continent Petroleum Corp. and McCulloch have a Simpson sand well doing around 300 barrels on the swab and offers some interest as to Wilcox possibilities.

Turkey Mountain sand production was obtained in a new area the first of the week. McDougal and others, in the SE NW NW of 21-17-15E found sand at 1907-09 and the well flowed by heads. The oil is 35 gravity.

Completions in N.E. Central, West, Panhandle and North Texas, Week Ended February 11, 1928

NORTH AND EAST CENTRAL TEXAS

Anderson County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Humble	1-Smith	Roberts	3720-3732	130

Brown County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Phillips	10-Newsome	Presslar	1294-1303	125
Pandem	2-Curray	Betts	1109-1121	330
Syndicate	1-Curray	Betts	1110-1124	150
Cranfill et al	1-Newton	Honeycutt	1142-1154	72
Choates	1-Carter	Messers	785-885	3½M
Coates-Wall	1-Murphy	H&TB	T.D. 1735	Dry
Cranfill et al	1-Hill	Mudgett	T.D. 1307	Dry
Cranfill et al	1-Whitehead	Broom	T.D. 712	Dry
Forest	1-Brooks	Hernendez	T.D. 1142	Dry
Simms et al	1-McChristy	Derr Co.	T.D. 725	Dry
Aldridge	1-Woods	Gentry	T.D. 660	Dry

Callahan County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Gibson et al	5-Snider	BBB&C	T.D. 1088	Dry
Young-Alex	1-Wheeler	BBB&C	T.D. 1208	Dry

Coleman County

Company	Well Farm	Location Survey	Depth	Init. Prod.
McChesney	1-Story	Sprogue	T.D. 1519	Dry
Dallas	1-Bobbington	Ross	1034-1066	25

Eastland County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Moody et al	2-Dyer	TP	3520-3535	6M
Rattlesnake	1-Scott	Marshall	T.D. 3740	Dry

Shackleford County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Harris et al	2-McLemore	White	T.D. 751	Dry
Hughes	1-Hill	BAL	T.D. 1056	Dry

Limestone County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Alexander et al	1-Jackson	McKenzie	T.D. 2818	Dry

NORTH TEXAS

Archer County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Wilson	4-Farmer	N A R	1531-1535	42
Panhandle et al	3-Farmer	N A R	1534-1547	12
Panhandle et al	4-Farmer	N A R	1504-1509	35
The Texas	1-Carvey	JCSL	T.D. 1203	Dry
Bowen	1-Herron	TE&L	T.D. 902	Dry

Cooke County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Murchinson	1-Mitchell	Toby	T.D. 1856	Dry
Rightaway	3-M K & T	MKT	1651-1676	10

Grayson County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Simpson et al	2-Whal	Reeves	T.D. 1384	Dry

Montague County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Oil Operators Trust	2-Bouldin	Chacon	801-818	28

Wichita County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Lambert	1-Barton	Spillers	1746-1747	60
Halbrook et al	1-D K & K	KWVEL	T.D. 1826	Dry

Wilbarger County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Simms	1-Showers	H&TC	T.D. 2503	Dry
Phillips	15-Waggoner	H&TC	2180-2195	115
Roxana	4-Waggoner	H&TC	2567-2571	90
Waggoner	4-Waggoner	H&TC	2334-2405	38
Phillips	3-Waggoner	H&TC	2276-2279	80
Waggoner	2-Waggoner	H&TC	2305-2311	30
Fain et al	1-Waggoner	H&TC	2345-2357	40
Petroleum Prod	2-Waggoner	H&TC	2384-2405	210

Young County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Boller	6-Gregg	Rohus	746-777	50
Rannel	2-Jack	YCSL	515-547	98
Alexander et al	1-Johnson	Sargent	570-575	36
Long et al	1-McCagren	TE&L	T.D. 1145	Dry
Amerada	1-Johnson	TE&L	T.D. 653	Dry

PANHANDLE

Gray County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Danciger et al	1-Jackson	H&GN	2996-3045	3200
Danciger et al	6-Jackson	H&GN	2900-3072	2800

Hutchinson County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Timms	1-Jordan	I&GN	3025-3115	210

WEST TEXAS

Howard County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Coile et al	2-Roberts	W&NW	1850-1875	75
Schermerhorn et al	1-Roberts	W&NW	1879-1893	1.4M
Peer	1-Read	T&P	T.D. 3420	Dry
The California	1-Fisher	T&P	T.D. 3833	Dry

Pecos County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Douglas et al	2-Sallman	TC	T.D. 1612	Dry
Olean	1-Harrel	GC&SF	T.D. 4030	Dry
The California	1-Smith	TC	1350-1463	74 (1 hr.)
Mid-Kansas et al	13-Yates	I&GN	962-1057	327 (1 hr.)
Mid-Kansas et al	23-Yates	I&GN	980-995	22 (1 hr.)

Upton County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Wise et al	1-Porter	CCSD&RGNG	3416-3517	20
Paxton	2-Orient Right-way	GC&SF	1959-2042	240

Completions in N.E. Central, West, Panhandle and North Texas, Week Ended February 18, 1928

NORTH AND EAST CENTRAL TEXAS

Brown County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Gilman et al	2-Hickman	Benson	1252-1269	469
Mitcham	1-Keller	Denny	1031-1036	16
Lehman et al	5-Evans	Woodward	T.D. 672	2
Swoveland et al	1-Chipman	Comanche	T.D. 2825	Dry
Syndicate	1-Bush	Kenny	T.D. 1662	Dry
Mitchell	1-Alcorn	Honeycutt	T.D. 1163	Dry
Ryan et al	1-Fuller	Jennings	T.D. 1110	Dry
Baker et al	1-Smith	Smith	T.D. 635	Dry

Callahan County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Gibson et al	3-Wulie	D&DA	T.D. 870	Dry
Pardee	1-Snider	BBB&C	T.D. 1209	Dry

Concho County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Parks et al	1-Schultz	Morris	T.D. 1515	Dry

Eastland County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Tex-Pac	1-Cochran	H&TC	T.D. 3073	Dry
Panhandle	4-Hightower	Van Norman	1165-1176	1

Jack County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Christie Bros.	3-Jones	SP	T.D. 2350	Dry
Security Dlg.	6-Cullers	Cullers	1994-2000	35
Security Dlg.	7-Cullers	Cullers	2005-2012	60

Jones County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Phillips	2-Vestal	TP	2535-2547	50

Navarro County

Company	Well Farm	Location Survey	Depth	Init. Prod.
De Armand Bros. et al	1-Murphy	Taylor	T.D. 2370	Dry
Alexander et al	1-Humphreys	Autrey	T.D. 3102	Dry

Palo Pinto County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Camp	1-Castello	Williams	T.D. 2513	Dry
French et al	1-Taylor	T&P	T.D. 1485	Dry

Shackleford County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Roeser et al	1-Cook	....	1347-1364	200
Wiley et al	3-Mathews	ET	1145-1155	1½M
Big States	3-Webb	TP	949-962	10
Engle Bros. et al	1-Mathews	ET	T.D. 1229	Dry
Milham	1-Clausell	TE&L	T.D. 2945	Dry
Swallow et al	1-Reynolds	TP	T.D. 1250	Dry

Stephens County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Lyman et l	1-Curry	TE&L	3092-3180	¾M
Thompson et al	1-Riddle	TP	T.D. 2250	Dry
McKinnon et al	1-Langford	TP	T.D. 2400	Dry
Texas Fidelity	1-Cook	TP	T.D. 2230	Dry
Phillips	2-Post	TP	T.D. 2270	Dry
Tex-Pac	6-Pierce	TP	T.D. 1805	Dry

Young County

Company	Well Farm	Location Survey	Depth	Init. Prod.
United Royalties	1-Wallace	Johnson	T.D. 2998	Dry
McCoy et al	1-Bawers	Hart	T.D. 2395	Dry
Mann et al	1-Marton	Hill	T.D. 2420	Dry
Paull	6-Morrison	Sherrill	T.D. 1450	Dry
Pitzer et al	3-Morrison	Sherrill	T.D. 2394	Dry
Nash et al	2-Ware	Manning	2181-2191	15

NORTH TEXAS

Archer County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Continental et al	8-Wilson	ATNCL	T.D. 1535	Dry
Wilson	1-Carr	EL&RR	T.D. 1360	Dry
Silkwood et al	1-Davidson	Roberts	T.D. 802	Dry
Gwynn	1-Carter	TE&L	T.D. 1250	Dry

Cooke County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Rightaway	4-M K T	M K T	1300-1356	22

Montague County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Continental et al	4-McGaughey	Chacon	1232-1270	13
Oil Operators Trust	3-Bouldin	Chacon	820-828	30
Bridwell et al	1-Howard	Robertson	T.D. 1820	Dry
Washington	1-Pardley	....	T.D. 1910	Dry

Wichita County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Everett	2-Cooper	WCL	T.D. 1737	Dry

Wilbarger County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Gulf Prod.	1-Fluhman	McKinney	T.D. 2602	Dry
Fain et al	1-Waggoner	H&TC	T.D. 1317	Dry
Phillips	11-Waggoner	H&TC	1860-1878	60
Phillips	12-Waggoner	....	2583-2595	10
Phillips	1-Waggoner	H&TC	2293-2295	22

Young County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Williams et al	1-Casey	TE&L	T.D. 1486	Dry
Pennell et al	1-Johnson	Sargent	T.D. 640	Dry

PANHANDLE

Gray County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Skelly	2-Jackson	H&GN	2835-3140	174&7M
Lefors	1-Lefors	Twste	2200-2625	70M

Hutchinson County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Phillips	1-Sanford	H&TC	2933-2968	306
Empire	7-Johnson	A&B	2815-2860	250
Rvan Cons.	1-Cockrell	M&C	2850-2992	80
First Nat'l et al	2-Cockrell	D&SE	T.D. 3050	1

Wheeler County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Watchorn	2-Sheldon	H&GN	1890-1952	48M

WEST TEXAS

Coke County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Danciger	1-Byers	Clinton	T.D. 3506	Dry

Crane County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Humble	1-Univ.	Univ.	T.D. 3180	Dry
Independent	4-Univ.	Univ.	2800-2895	250

Howard County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Bowers et al	1-Jones	T&P	T.D. 3215	Dry
Lee et al	1-Hyman	W&NW	T.D. 1435	Dry

Pecos County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Gulf Prod.	5-Smith	TC	1497-1702	722
Gulf Prod.	6-Smith	TC	1495-1675	225 (1 hr.)
Gulf Prod.	7-Smith	TC	1515-1690	170 (1 hr.)
Mid-Kansas et al	11-Yates	I&GN	1305-1386	2509 (10 hrs.)
Mid-Kansas et al	24-Yates	I&GN	940-1035	75
Mid-Kansas et al	25-Yates	I&GN	1005-1040	100 (1 hr.)

Reagan County

Company	Well Farm	Location Survey	Depth	Init. Prod.
Skelly	1-Univ.	Univ.	3131-3157	40 (5 hrs.)

New Field Operations in Oklahoma, Kansas, Panhandle, North, North Central and West Texas, Week Ended February 18, 1928

OKLAHOMA

Carter County

Company	Well No. Farm	Location
Schermerhorn et al.	3-Crockett	SEc SW NW 23-1-3 W
Magnolia	2-Gabrel	SEc NW SW 23-1-3 W

Creek County

Independent	1-Tankaney	SEc NE SE 7-19-9
Kennedy et al.	3-Barnett	NWc SW SW 24-18-11
Hammon et al.	1-Peeper	NEc NW 10-16-10
Wilcox	5-Dixon	NEc NW 18-14-10

Grady County

Oklahoma Gas	5-Farwell	NWc SW SE 23-5-8 W
Commercial Dev.	1-Crisman	C NE NE 21-4-7 W
Franklin	1-Garden	SEc SW NE 1-4-7 W

Hughes County

Transcontinental	1-Diamond	SEc NW 6-8-10 E

Kay County

Ingram et al.	1-Johnson	SWc NE 36-28-1 W
Industrial	1-Walker	C NE NE 2-27-1 W
Mummert Drlg. et al.	1-Harris	SWc SE 27-27-3 E

Logan County

Roxana	4-Rouse	NEc 19-19-4 W
Roxana	1-Ross	SEc 19-19-4 W
Roxana	1-Rouse	SWc 20-19-4 W
Roxana	2-Sebranek	NEc 30-19-4 W

Murray County

Gilcrease et al.	1-Wolfe	NEc SE SE 20-1-2 E

Muskogee County

Boyle et al.	2-Simmons CWL	SW NE 10-15-15 E

Okfuskee County

Deaner et al.	3-Grayson	NEc SE SW 3-12-11

Okmulgee County

Denver P & R.	7-Thomas	CNL SW NE 32-13-11	OWD
Morgan	1-Meyers	SEc SW 11-11-13	
Roach et al.	2-Kennedy	SEc NE 15-15-12	

Osage County

Osage Gas	385-	SEc SW NW 5-27-11
Lewis	6-	SEc NW SW 2-26-6
Standish	7-	NEc NW NW SE 2-25-11
Davis et al.	1-	NWc NE SW 5-21-9

Pontotoc County

American	1-Brown	SWc SE 27-5-6 E
Shaffer	5-Yoakum	SWc 9-5-8 E

Pottawatomie County

Boles	1-Rawley	SEc NW 25-7-3 E
Gypsy	2-Sullivan	SWc NE SE 25-7-3 E
Magnolia	2-Harper	NEc SW 25-7-3 E
Pierce	2-Davis	SWc SE NE 25-7-3 E
Continental	4-Neghnguit	SEc NE NW 19-7-4 E
Continental	5-Neghnguit	NEc NW 19-7-4 E

Seminole County

Texas	8-Anderson	NEc NW SE 2-9-5 E
Roxana	2-Hearn	SWc NE NW 13-9-5 E
Larkin	1-Cluck	NEc NW NW 4-9-6 E
Texas	4-Coker	SWc NW SW 1-7-6 E
I. T. I. O.	4-House	SEc NE SE 2-7-6 E

Sequoyah County

Citizens	1-Greenstreet	SWc NE SE 33-12-27 E

Stephens County

Franklin	4-Brittain	NWc SW SE 12-1-4 W
Skelly	7-Krebbs	SEc SW SE 13-1-4 W
Magnolia	2-Bartley	NWc 20-1-8 W OWD
Fisher et al.	1-Callahan	CSL SE SE 21-1-8 W
Hupp et al.	3-Burk	SWc NW NE 34-1-8 W
Magnolia	5-Harris	SEc NW SW 36-1-5 W
Turman	1-Burke	NWc 4-2-8 W

Tulsa County

Glidden	1-River Bed	NEc NW NW SE 15-19-11
Jackson et al.	1-Warrier	SWc SW NW NE 21-19-12

KANSAS

Chautauqua County

Bell et al.	1-Chaffine	SWc NE 1-32-10 E

Cowley County

Shawver et al.	1-Mullett	C NW SE 31-34-3 E

Elk County

Truby et al.	1-Silger	SEc NE SE 25-30-10 E
Pennock	1-Faulk	NEc SW 36-30-10 E
Union Gas	23-Webb	C NE NW 14-31-10 E
Blaudell	2-Baker	C NL NW 28-31-10 E
Dehman Bros.	2-Warren	SWc 36-31-10 E

Greenwood County

Darby	7-Schwab	SEc SW NW 30-22-13 E
Darby	8-Schwab	SWc SE NW 30-22-13 E
Transcontinental	1-Frankhouser	NEc NW 2-22-12 E
Reed et al.	1-House	NEc SW SW 28-26-9 E
Mohawk	2-Cross	NEc SW NE 7-27-11 E

Marion County

Crawford et al.	1-Weston	NEc NW SW SE 14-17-4 E

Pottawatomie County

Shaw et al.	1-Washington	SEc Lot-17, 7-9-8 E

Russell County

Mid-West	33-Austin	SEc SW SE 30-12-15 W	
Keys	1-Baxter	NWc SE SE 32-13-15 W	OWD
Keys	2-Baxter	NWc SE SE 32-13-15 W	
Keys	1-Mermis	SEc SW NE 32-13-15 W	
Mid-West	4-Mermis	NEc NW SE 32-13-15 W	
Streeter et al.	1-Gorham	SWc NE 33-13-15 W	
Keys	1-Mermis	NWc SW SW 33-13-15 W	

Sumner County

Roxana	1-Barnes	NEc SW SW 14-32-2 E

Trego County

Central Commercial	1-Ellis	NEc SW NE 20-13-21 W

Wabaunsee County

Doric	1-Jones	NEc SW 24-11-10 E

TEXAS

NORTH AND NORTH CENTRAL

Anderson County

Humble	1-Jones	....	Survey Roberts

Archer County

The Texas	1-Tuberville	Blk-88	TCSL
Humble	1-Farmer	....Bell Co.	Sch. Land
Panhandle et al.	1-Farmer	Blk-3	NAR
Panhandle et al.	1-Farmer	....	Meade
Johnson et al.	1-Wilson	Blk-26	GCSL
Kelleher et al.	1-Andrews	Abstract-141	TP

Callahan County

Garner et al.	2-Hatchett	Sec-30	D&DA
House et al.	1-Clinton	Sec-15	BOal
Pardee	1-Jackson	Sec-115	BBB&CRR

Coleman County

Roxana	1-Gray	Blk-179	Young
Brodrick et al.	1-Buck	Blk-269	Cockran
Atkinson et al.	1-Stames	Sec-2, Blk-1	GH&H

Brown County

Duffield et al.	1-Cox	Blk-55	Duncan
Cranfill et al.	1-Hill	Blk-63	Mudgett
Syndicate	1-Hutton	....	Nobles
Syndicate	2-Curry	....	Betts
Eram	1-Galyan	Sec-10	H&TB
Pandem	3-Hutton	Blk-4	Nobles
Pandem	4-Curry	....	Betts
Ramsey	4-Henson	Blk-147	Logan
Aldrige	2-Woods	....	Gentry
Scrivnoret et al.	1-Windham	....	Byrd
Amerada	5-Gilbreth	Blk-4	SA&MG
Clark Buffalo	1-Brown Co.	Fee Land Blk-624	Kenney
Cen Tex	1-Bull	Blk-623	Honeycutt
Cen Tex	2-Alcorn	Blk-623	Honeycutt
Cranfill et al.	2-Newton	Blk-623	Honeycutt
Schuler et al.	1-Boyson		Williams
Humble	4-Allen	Sec-7	Delgado
Humble	1-Allen	Sec-6	Delgado
Van Bibber et al.	5-E	Sec-6	Woodward
Pandem	1-Thompson	....	Clelland

Eastland County

Hooser	9-Fox	Sec-58	McLennon Co. Sch. Land
Hooser	10-Fox	Sec-58	McLennon Co. Sch. Land
Texas-Pacific	2-Fee Land	....	Van Normon

Foard County

Marland	1-Minnich	Sec-74, Blk-B	H&TC

Haskell County

Edmiston et al.	1-Rug	Sec-94, Abstract-946	Ross
Healdton	1-Houston	Sec-4, Blk-3	H&TC

Jack County

Burkett	1-Wade	Abstract-1033	Brown

Jones County

Phillips	1-Pomroy	Sec-16, Blk-19	T&P

Palo Pinto County

Tex-Pac	156-Stuart	Sec-74, Blk-4	T&P
Hill et al.	1-Doan	....	Lout.

Shackleford County

Albany	7-Reynolds	Sec-24, Blk-11	T&P
Deaner et al.	1-Harvey	Sec-6 Blk-14	T&P
Kingwood	2-Corsuch	Sec-82, Blk-13	T&P
Sterling	1-Wolker	....	Cooper

Stephens County

Edison et al.	3-Houston	Sec-32, Blk-6	T&P
Pace et al.	7-Ball	Sec-1217	TE&L

Young County

Stafford	1-Boone	Abstract-34	BBB&CR
Parker et al.	1-Newman	....Abstract-252	Sallie
Benson	1-Benson	Sec-1392-, Abstract-867	TE&L
Kissler et al.	1-Knox	Abstract-1711	Scott
Roberts	1-Thomas	Sec-155	TE&L
Reed et al.	1-Stewart	Blk-28, Abstract-1284	YCSL
Allday	2-Johnson	Blk-14	Sargent
Alexander	2-Johnson	Blk 15, Abstract-253	Sargent
Rennell et al.	5-Jack	Blk-23	YCSL
Rennell et al.	1-McKinley	Sec-1489	TE&L
Jacob	1-Hockaday	Abstract-1263	Uphan
Jacob	1-Taylor	Abstract-52	Baker

Wichita County

Stemp et al.	1-Chelson	Sec-4, Blk-4	DCSL
Humble	1-Griffin	....	Jordan
Lomaz Bros.	1-Chilson	Blk-4, Abstract-471	Ramsey

Wilbarger County

Consolidated	2-Wheeler	Sec-56, Blk-4	H&TC
Jeffers et al.	1-Waggoner	Sec-57, Blk-4	H&TC

WEST TEXAS AND PANHANDLE

Borden County

Marland	1-Murphy	C SW Sec-66, Blk-25	H&TC

Carson County

Amarillo	1-Poling	C NE NE Sec-12, Blk-Y-2	TTRR

Crockett County

Osage	3-Halff	Sec-70, Blk-1	I&GN

Garza County

Marland	1-Pippin	C NW Sec-1210	Young

Glasscock County

Weekly et al.	3-Roberts	SWc SE NE Sec-156, Blk-29	W&NW

Gray County

Gibson	9-Bowers	NEc Sec-92, Blk-B-2	H&GN
Reiger et al.	1-Hopkins	NEc Sec-84, Blk-B-2	H&GN

Howard County

Green	1-Clay	SEcSec-127, Blk-29	W&NW

Pecos County

Transcontinental	1-Univ.	C NE SW Sec-18, Blk-18	Univ.

Wheeler County

Vaughn	1-George	C SE NW Sec-96, Blk-17	H&GN

Winkler County

Humble	1-Hendricks	SEc Sec-32, Blk-26	PSL
Southern Crude	67-Hendricks	NE SW SW Sec-33, Blk-26	PSL
Atlantic et al.	3-Hendricks	NEc NW Sec-40, Blk-26	PSL
Humble	1-Walton	NWc SW Sec-48, Blk-26	PSL
Humble	1-Walton	SEc NE Sec-47, Blk-26	PSL
Humble	10-Hendricks	NE SW NW Sec-41, Blk-B-5	PSL
Republic Prod.	5-Hendricks	NEc SE Sec-41, Blk-B-5	PSL
Atlantic	5-Hendricks	SW NE SW Sec-34, Blk-B-5	PSL
Atlantic	6-Hendricks	NW SE SW Sec-34, Blk-B-5	PSL
Humble	9-Hendricks	NEc Sec-34, Blk-B-5	PSL
Humble	4-Hendricks	SEc NE SE Sec-29, Blk-B-5	PSL

J. G. Lyons is Elected President Of Okmulgee Oil Assn.

Staff Special
OKMULGEE, Feb. 18

LACK of co-operation within the industry, lack of understanding between the larger companies and the small independent producers, overproduction, and to some extent the large amount of misinformation which is spread among the people by those seeking to further the cause of government control of the business—these were some of the topics informally discussed at the annual meeting of the Okmulgee District Oil & Gas Association here today.

Officers elected were: J. G. Lyons, president; W. E. Wood, vice-president; C. P. Wangerien, vice-president; E. P. Jones, chairman of the finance committee.

E. P. Jones, J. T. King, J. G. Lyons, E. H. Moore, C. L. McMahon, W. C. Newman, J. J. Moroney, J. W. McCulloch, J. J. Schock, M. C. French, C. J. O'Hornett, R. W. Clark, H. H. Diamond, W. B. Pine, W. E. Wood, T. A. Johnston, Don V. Eells, D. M. Logan, Waite Phillips and D. M. Smith, were elected directors.

E. P. "Tex" Jones, the retiring president, spoke of the benefits to be derived from membership in the organization and told some of the efforts the association had made in combating legislation considered unfavorable to the oil industry as a whole.

One danger which besets the industry today is the increasing tendency toward government control, he said. By allowing the federal authorities to regulate the oil business the industry is admitting that it is incapable of managing its own affairs at a profit, and when this belief is permitted to spread it will become almost impossible for the industry to get outside capital to aid in the development of its resources. Particularly will this work a hardship on the small producer.

C. I. O'Neill, secretary, quoted some figures which showed that during the past year the Okmulgee district had produced over 158 million barrels of oil, as was shown by pipe line runs. This amounted to 12.6 per cent of the worlds output of oil during 1927. During the year 1,685 wells were drilled, of which 1,179 were producers having an average initial production of 1,266 barrels per day; 101 were gas wells and 405 were dry holes. According to Mr. O'Neill the Okmulgee District Oil and Gas Association has a membership of 206, with nine states represented on the roster of members.

R. E. Stewart, traffic manager, G. T. Granger, in charge of the Okmulgee refinery, and Edwin I. Reeser, director of public relations, all of the Barnsdall Refineries, Inc. were present and made short talks. Mr. Stewart attacked the Hoch-Smith bill, adopted by a joint resolution in Congress Jan. 30, 1925, which directed the Interstate Commerce Commission to change the rate structure of the country as will promote the freedom of movement by common carriers of the products of agriculture affected by the then existing agricultural depression. The falling value of oil and its refined products is still further hurt by the freight rates of the southwest and unless the bill is repealed in the near future Mr. Stewart warned the members of the Association that they could expect to pay more for outgoing crude and its refined products and considerably more for incoming supplies.

Mr. Granger spoke briefly on the refining practices of the Barnsdall and Mr. Reeser outlined the general policy of the company during the past year of depression.

N. Y. Transit May Abandon Lines Unless Traffic East Increases

Staff Special
CLEVELAND, Feb. 20

INTIMATION that the New York Transit Co. may abandon its pipe lines to the Atlantic seaboard is contained in the annual report of President D. S. Bushnell to stockholders on the 1927 business.

The barrelage movement to the Atlantic seaboard fell 63 per cent below the 1926 movement, Mr. Bushnell reported, because of the competition of tank ships.

"Should there be no resumption of business through your company's lines to the seaboard within the next few months, your directors will be forced to recommend to stockholders some action looking toward a disposition of the property that will further reduce expenses and save taxes, with a probable readjustment of capital structure and distribution of such assets as are not needed in the business," he wrote. He also said there had been a small increase in gathering line operations in western New York. This undoubtedly was due to increased production through flooding operations in the Allegany and Cattaraugus fields.

With the opening of the California fields in 1923 the movement of Mid-Continent crude to the Atlantic seaboard plants fell rapidly. The New York Transit earnings that year were $238,732 after all charges, compared with $549,194 the year before and $820,957 in 1921, a year of depression for most of the oil industry.

In 1924 the company netted $186,418; in 1925 $243,792, and in 1926 $106,065. In 1927 the company suffered a deficit of $69,433. The 1926 net profit was only at the rate of 2.12 per cent.

The company has about 1525 miles of gathering and trunk lines. Its main trunk line system extends from Olean, N. Y., to short lines in the east that connect with the refineries of the Standard Oil Co. of New York and Standard Oil Co. of New Jersey on New York harbor, and from Olean to the Standard of New York's refinery at Buffalo. The Standard of New Jersey has a line of its own, the Tuscarora Oil Co., which extends from the Ohio-Pennsylvania border to Bayway, N. J. The trunk lines of the New York Transit have a daily capacity of 45,000 barrels but have transported little oil to the seaboard since the middle of 1926.

The company ceased paying dividends in 1926.

Should the company abandon its seaboard lines, it is probable that it will scrap the pipe from Olean to its eastern terminus.

The Crescent Pipe Line Co. whose line extended through southern Pennsylvania to the plants in the Philadelphia region, was liquidated last year after its traffic became so light it was not profitable. Its lines were scrapped.

The New York Transit Co. Dec. 31 had $2,751,671 invested in U. S. government railroad and municipal bonds and $115,673 cash. Its balance sheets of Dec. 31, 1926 and 1927, compare:

ASSETS	1927	1926
Plant	$6,181,967	$6,652,493
U. S. bonds	777,177	.....
Other bonds	1,974,494	.....
Cash	115,673	*2,720,298
Acc'ts receiv.	85,554	.....
Other assets	28,297	53,433
Total	$9,163,162	$9,426,224
LIABILITIES		
Capital stock	$5,000,000	$5,000,000
Acc'ts payable	87,077	†740,569
Tax reserve	5,908	.....
Fire, ins., death benefits	494,809	.....
Depreciation res.	2,301,228	2,342,083
Surplus	1,274,140	1,343,572
Total	$9,163,162	$9,426,224

*Includes investments and receivables.
†Includes reserves for taxes and insurance.

HOPE
VERTICAL
COMPRESSORS

"The Modern Gas Compressor for the Modern Plant" is fully described in Bulletin 1601, giving details of design and construction, with complete specifications. Use the coupon below to secure your copy.

Bulletin 1601

The Coupon

Name _____

Mailing Address _____

City _____

Company _____

HOPE ENGINEERING AND SUPPLY COMPANY
(A State)
MOUNT VERNON, OHIO, U.S.A.
DALLAS, TEX. TULSA, OKLA. CASPER, WYO.

Hendricks Field Producing 45% Of Present Possible Yield

Staff Special
HOUSTON, Feb. 16

POTENTIAL production from Winkler county's 65 producing oil wells had reached 220,000 barrels daily, Feb. 15. All but one of the wells were in the Hendricks field, southwest of Kermit, where exploited production now averages roundly 100,000 barrels daily. The other well is the small discovery completion of the Llano-Roxana partnership on the Scarbauer ranch, 12 miles north of Hendricks development. It is good only for 25 to 50 barrels daily, which condition has applied for months.

Fourteen interests with production and eight others actively drilling in the Hendricks area account for about 130 operations under way, ranging from locations and rigs to tests that have already penetrated the "big lime" pay found at depths below 3000 feet. About 60 per cent of the tests drilling are in, or on top of, the lime; their completion being delayed because of lack of facilities for handling production.

Atlantic Oil Producing Co.'s. 71-mile pipeline from Hendricks field to Midland, which will make "shuttle" deliveries of crude to Magnolia Petroleums Co's. east-going trunk facilities, is the only outlet of its kind in the field. Humble Pipeline Co's. 8-inch outlet to connection with its other west Texas facilities at McCamey, Upton county, will be completed about March 15.

Crude shipments, in the meantime, consist almost entirely of movements through short pipelines to the Texas & Pacific railroad for tank car loadings. Such shipments last week averaged roundly 40,000 barrels daily from Winkler county, as compared with total similar movement from all west Texas territory of about 60,000 barrels daily. For January, tank car shipments of Hendricks crude averaged 33,420 barrels daily out of a total of about 55,000 barrels daily for the whole of west Texas.

Production now being exploited in excess of tank car shipments is going into storage in the Winkler area, which is one of the few divisions of the west Texas region where this condition applies. With the exception of the University field, in Crane county, where sizable stocks of crude were built up in 1927, it has been the west Texas policy to avoid above-ground storage as much as possible.

Storage construction in Winkler county already tops 3,000,000 barrels and about 1,600,000 barrels of steel stock room is now building. Roxana Petroleum Corp. is also going ahead with construction of a 1,000,000-barrel concrete tank at Monahans, on the Texas & Pacific, along the route of the west Texas gathering facilities of the associated Shell Pipeline Corp., which next June will complete a west Texas-to-Healdton 10-inch trunk outlet for Hendricks field and McCamey district crude.

The Roxana-Shell tank, elliptical in shape, will be 524 feet long, 504 feet wide, 36 feet from roof to floor and 25 feet high at the eaves. Another of similar construction is planned for the McCamey territory.

Gulf Production Co's. program for Winkler county, part of which has been completed, calls for the eventual building of 20 steel storage tanks of 80,000 barrels capacity each; Humble has 10 tanks of 55,000 barrels capacity each under construction; and Magnolia's plans are said to call for about 1,000,000 barrels additional steel storage room.

Water encroachment in Hendricks field has not tempered the rate of production except in a half dozen wells that are patently edge completions and, therefore, structurally low. Conditions under which top water gets into the pay and is produced with the oil were described on page 28 of the Feb. 15, 1928 issue and page 46 of the Feb. 1, 1928 issue of NATIONAL PETROLEUM NEWS. Encroachments are described in competent quarters as failing to affect ultimate yields of crude, which have been variously estimated for the Hendricks field at totals upwards from 155,000,000 barrels.

Fourth Deep Lime Well In Roberts Field

HOUSTON, Feb. 18.—Lockhart Bros., of El Paso, are completing the fourth deep lime producing well in the Roberts-Settles division of the Chalk development in southeastern Howard county. The Lockhart well, in W&NW block 29, sec. 157, swabbed 100 barrels an hour at 3019 feet in an uncompleted stage.

Earlier deep lime wells of the Magnolia, Owen & Sloan, and Schermerhorn oil companies, which are capable of producing about 9,000 barrels daily of 28 gravity sulfur crude, are shut in under an operating agreement until market outlets can be provided. Tests now drilling will be completed and 24-hour gauges of open flow well capacities taken before shutting them in.

The Roberts-Settles deep lime area is near the west edge of the shallow Chalk development in southeastern Howard county, where the upper pays are found at drilling depths of 1500-1800 feet.

Lockhart Bros., who also operate a refinery under the corporate style of the Rio Grande Oil Co., at El Paso, have been recently active in Loving County, where their test in W&NW block 1, sec. 82, created a ripple of excitement after shooting with 150 quarts of nitro-glycerin at 4172-4206 feet. The well made about 300 barrels the first day after "shooting," and 185 barrels the second day. It was originally completed about two years ago, settling to an average of six barrels daily from its initial production of 25 barrels.

Yates Field Marketing Dispute Brings Suit

HOUSTON, Feb. 18.—Suit filed in Forty Eighth district court at Fort Worth, Feb. 18, discloses that Transcontinental Oil Co. is asserting right to handle and market half of the Yates field crude produced by its operating partner, the Mid-Kansas Oil & Gas Co., in the Pecos county area. The Transcontinental petition charges that the Mid-Kansas, which is a subsidiary of Ohio Oil Co., is claiming the right to handle and market all the production from their jointly owned Yates leases, totaling approximately 11,000 acres.

Transcontinental's petition refers to previously rumored plans of a subsidiary pipeline company, which had been credited with intention of spending $10,000,000 in building trunk carrier facilities, a refinery and tank farm on the Texas Gulf Coast for handling of Yates field crude. The petition recites that it is necessary for such a new pipeline to be built to develop crude oil competition in the field.

Yates field production is being held to about 50,000 barrels daily through action of producers in pro-rating the market outlet provided by Illinois Pipeline Co., companion corporation to the Mid-Kansas, and the Humble Pipeline Co. These two interests together provide outlet for about 48,000 barrels daily. Gulf Pipeline Co., which is not a party to the pro-rating agreement, but operates sympathetically, handles a few thousand barrels of additional oil daily for the affiliated Gulf Production Co. As the Gulf operates for its own account only, the Illinois and Humble pipelines are the only market outlets for common purchaser oil from the field.

Joint production of the Mid-Kansas and Transcontinental companies on properties developed by the first mentioned is now being pro-rated on a basis of roundly 14,400 barrels, or approximately 30 per cent of the total of permitted runs under the pro-rating agreement.

Physical Control of Refining Operations Urgent Need of the Future

By Luis de Florez*

Presented before Petroleum Division, A. I. M. E., New York, Feb. 20-23

THE successful control of any operation, whether industrial, military, or purely physical, is fundamentally dependent upon the same elements:

1. The securing of accurate and pertinent information concerning the factors involved in the operation.
2. Correct interpretation of their relationship as affecting future results.
3. Efficient means for effecting changes in the factors governing the operation to shape the result.

The analogy which exists in the control of operations in these widely differing fields of action is of utmost interest, and in considering tne physical control of a process, the realization of its existence permits a clearer conception of the steps required to achieve results and aids in formulating the problems to be met.

Let us imagine, for instance, the requirements for successfully conducting a business. It is evident that the first requisite lies in obtaining continuous and reliable information concerning the functioning of its various branches, and in detecting, with the least possible delay, any tendency of change in their functions; next, in correctly analyzing this information by comparison with past records, showing the relation of the particular business to general conditions in the trade; and finally, in employing means for counteracting any unfavorable change in general conditions, or compensating for its effects by an appropriate action.

Proper Knowledge Necessary

LIKEWISE, in military operations, the success in carrying out a plan lies primarily in the maintenance of proper intelligence and communication service, which furnishes information as to the disposition of forces; in correct analysis of the ascertained positions, guided by fundamental knowledge of tactics; and finally, on the efficient carrying out of orders and effecting corrective movements.

In the physical operation of a process, such as for example cracking, our information is obtained by pressure and temperature instruments, etc., which permit us to visualize existing conditions under which the operation is being carried out. The information at hand is then analyzed and certain conclusions arrived at as to the results which will be obtained under the observed conditions. If this analysis should indicate, in the light of past experience, that an unfavorable result will be obtained, certain conditions of operation are altered until the desired results are assured.

In the physical control of a refining process we must rely on experience for the choice of information and its interpretation. Each type of process has its characteristics, and the data required and its bearing on the result will, obviously, be individual to the process in question. Likewise, the means and methods of effecting corrections present different problems in each case, and the choice of the most favorable procedure to carry out its action must vary with the circumstances.

There are, however, some general considerations which govern the choice of the variables which we have to indicate the action of equipment and on which we base the conclusions which will result in the necessity of making corrective changes. These general considerations also apply to the choice of means or variables with which to obtain the regulation required.

Two Main Functions

There are two main functions to be performed in a scheme for control; one consists of measuring certain operating conditions and detecting their change; the other consists of applying corrective changes. These two functions, one of indication and the other of regulation, are generally found to be independent, and in a given process, a number of ways may present themselves for carrying out either function.

The choice between the various ways of carrying out these functions and their last analysis are governed by a factor of time and a factor of simplicity. It is obvious that when obtaining a reading or in effecting a correction, a certain time must elapse between the occurrence of the change and the appearance of its effect in the process. It is equally obvious that the desirable variable to utilize for control would be the one in which this time factor is reduced to a minimum.

AS an illustration of this, let us consider the result of a process whose ultimate object is the making of a certain quality and quantity of product. It is evident that, if we could control a process on the final results, it would be the simplest way to operate. From the point of view of operating control, however, examination of the product, whether periodical or continuous, is wholly inadequate to serve the purpose, since an appreciable time must elapse between

*Consulting Engineer, New York.

Feeling the Pulse of the Refinery

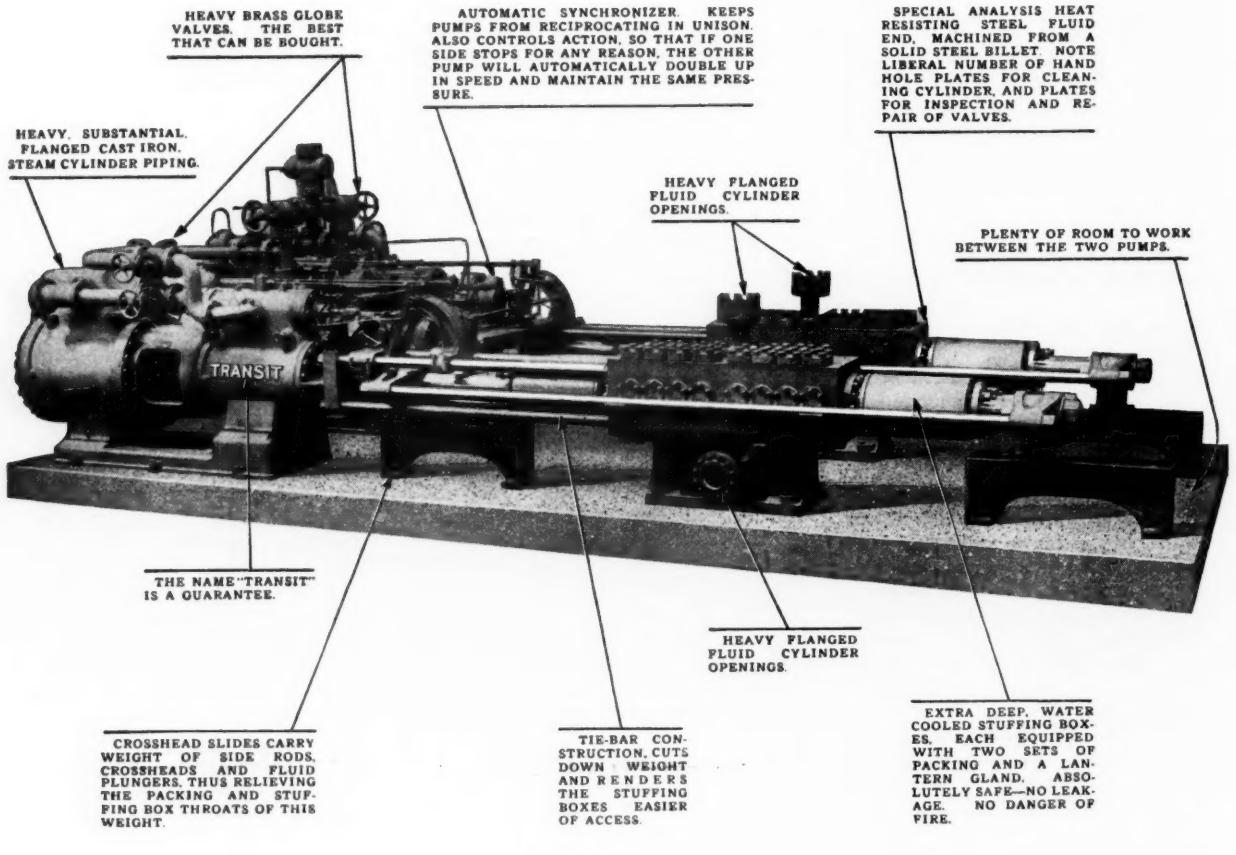
LUIS DE FLOREZ is recognized as an authority on automatic control of refining operations. He is the inventor of a device for control of fuel supply that has been adopted by The Texas Co. and is applied to Holmes-Manley stills. In two articles* previously published in NATIONAL PETROLEUM NEWS, Mr. de Florez has discussed the method of controlling operation by controlling fuel supply to cracking stills.

In the accompanying article he analyzes some of the other phases of the control problem and suggests how they may be handled. He states that the field of closer control of refinery apparatus in operation is one of the most promising for the refinery technologist.

Watching the stream, taking intermittent or continuous samples of the product is not of much use, Mr. de Florez says, because the product has then been made and it is too late to do anything about it.

*Feb. 9, 1927, page 85; Sept. 21, 1927, page 105.

Features of TRANSIT HOT OIL PUMPS *visualized* for you


HEAVY BRASS GLOBE VALVES. THE BEST THAT CAN BE BOUGHT.
AUTOMATIC SYNCHRONIZER. KEEPS PUMPS FROM RECIPROCATING IN UNISON. ALSO CONTROLS ACTION, SO THAT IF ONE SIDE STOPS FOR ANY REASON, THE OTHER PUMP WILL AUTOMATICALLY DOUBLE UP IN SPEED AND MAINTAIN THE SAME PRESSURE.
SPECIAL ANALYSIS HEAT RESISTING STEEL FLUID END, MACHINED FROM A SOLID STEEL BILLET. NOTE LIBERAL NUMBER OF HAND HOLE PLATES FOR CLEANING CYLINDER, AND PLATES FOR INSPECTION AND REPAIR OF VALVES.
HEAVY, SUBSTANTIAL, FLANGED CAST IRON, STEAM CYLINDER PIPING.
HEAVY FLANGED FLUID CYLINDER OPENINGS.
PLENTY OF ROOM TO WORK BETWEEN THE TWO PUMPS.
TRANSIT
THE NAME "TRANSIT" IS A GUARANTEE.
HEAVY FLANGED FLUID CYLINDER OPENINGS.
CROSSHEAD SLIDES CARRY WEIGHT OF SIDE RODS, CROSSHEADS AND FLUID PLUNGERS, THUS RELIEVING THE PACKING AND STUFFING BOX THROATS OF THIS WEIGHT.
TIE-BAR CONSTRUCTION, CUTS DOWN WEIGHT AND RENDERS THE STUFFING BOXES EASIER OF ACCESS.
EXTRA DEEP, WATER COOLED STUFFING BOXES, EACH EQUIPPED WITH TWO SETS OF PACKING AND A LANTERN GLAND. ABSOLUTELY SAFE—NO LEAKAGE. NO DANGER OF FIRE.

Representatives

FRICK-REID SUPPLY COMPANY
Tulsa, Okla., or any store

ASSOCIATED SUPPLY COMPANY
Los Angeles, San Francisco
Bakersfield, Fellows

E. L. WILSON HARDWARE CO.
Beaumont, Texas

NATIONAL TRANSIT
Pump & Machine Co.
Oil City Pa.

DISTRICT OFFICES

NEW YORK PHILADELPHIA PITTSBURGH
CLEVELAND HOUSTON TULSA DENVER

Representatives

THE GLOBE SUPPLY & MACHINERY CO.
New Orleans, La

F. C. RICHMOND MACHINERY CO.
Salt Lake City, Utah.

MORTON McL. DUKEHART & CO.
Baltimore, Md

REEVES & SKINNER MACHINERY CO.
St. Louis, Mo

the occurrence of a change and the detection of its effect in the product itself.

The examination of the product indicates only past accomplishment and can serve only to confirm the fact that the apparatus has, or has not, been operated correctly during a period of time which is past and beyond recall. It cannot serve as a guide for the future, but only for judgment of the past.

INDICATION for control, therefore, must be based on some variable encountered at a step in the process in advance of the finished product, and record a condition which is intimately connected with the result, changes in which may permit a timely corrective action. On the other hand, as the desired indication is "advanced into the process", away from the final result, the more it will be complicated by other secondary variables which affect the product, and the more complicated will become the interpretation of its relation to the product, since other variables, although less important, will have to be considered in the analysis of the effect on the ultimate result. The choice of the variable for indication, therefore, must be a compromise between its factor of time and its factor of simplicity.

In a cracking operation in which our information is obtained by means of pressure gages, thermometers, level indicators, etc., placed at various points of the apparatus, it is obvious that we can obtain an almost unlimited amount of information by multiplying the number of instruments. This information, however, is not all of equal importance from the point of view of control, since many of the readings simply denote that parts of the apparatus, or auxiliary equipment, are functioning. We have learned that, in cracking, the product will be materially affected by the pressure and temperature in the system and that, if we rely on the maintenance of this pressure and temperature, favorable results will follow. The readings of pressure and temperature anticipate the final result since they are practically instantaneous and are, therefore, useful in control.

They do not represent the whole story, however, since other secondary variables must be considered, but they present the best compromise between the factors of time and simplicity. Thus we may have on the control board readings of steam pressure, fuel supply, condenser water, etc., which merely denote that the apparatus can function and which do not directly affect the quality or the quantity of the product.

On the other hand, the variations in pressure and temperature, which are also made to read on the control board, are carefully watched. We might conceivably dispense with the first class of readings, which are only of general interest, but we could not run the apparatus without specific information concerning the pressure and temperature, which may be considered indicating control factors.

Choice of Variable Important

The relative usefulness of information in the operation of a process is of immense importance, and constitutes a study in itself, specific not only to each process but each apparatus developed to carry it out. The primary requisite for control is evidently to choose the variable with which to operate. Skill in operation and technical knowledge must be relied upon to apply this pertinent information to obtain desired results.

The considerations governing the choice between different possible methods of applying corrective changes present a similar aspect. The effect of variations in the process should be prompt and should have an important effect on the product. Again, we have the necessity of compromising between the factor of time and the factor of simplicity, for usually, as we approach nearer to the direct effect on the product, we have combined with it the effect of secondary variables which complicate its action.

If we consider, for instance, the control of temperature at the top of a tower, it is evident that this might be varied by changing the tower radiation by means of air passages and dampers, or by varying the supply of reflux. Both these methods are possible, but the effect of the first would not be realized for an appreciable period of time, while the effect of the latter, particularly if the reflux is at a low temperature, can rapidly and quantitatively vary the temperature at a desired point and cause practically the needed change, which is the result desired.

It is obvious that the second method of control is more appropriate since it has a more direct effect and, further, has the advantage that, from a point of view of simplicity, its action is very close to the result. The secondary variables which complicate its action are only the quality of the reflux and its temperature.

Simplicity Is Desirable

THE ideal control scheme would be one where a single variable would give the desired indication of the result and a single variable regulated to effect corrections. In the rare instances where this is possible the problem of control is enormously simplified and can be accomplished by simple means. In practice, however, this can seldom be accomplished but it can be approximated, and one of the chief problems in working out a control scheme lies in stimulating this condition as far as possible.

As an illustration, we might consider a cracking furnace where fuel is admitted to a number of burners, where the temperature of the outlet of the coil has been found to be the proper indicating control and the rate of firing the regulating control. The fireman, in this case, is given an indicating temperature gage and a recorder. He has a fuel line which is maintained at a higher pressure than the burners and has a series of valves operating these burners. As the temperature rises he cuts the fire and vice-versa. The success of his firing will depend on the accuracy of the reading of the pyrometer and the way he effects changes.

Should the pyrometer point become coked during the operation, obviously he will be given a false reading and lose control of his apparatus. Should he operate the burners individually, effecting his corrections at four or five points, it will be difficult for him to make accurate changes. On the other hand, should the flow to the still vary, or the pressure in the fuel main fluctuate, he will have to contend with disturbing elements over which he has no control. It is, therefore, necessary to devise some means whereby he may be given the proper facilities to maintain control of the furnace, and assume the responsibility for its actions.

The pyrometer couple in coil heaters need not, necessarily, be placed at the outlet, but can be placed at some intermediate point which can be found by trial. A reading at this point may be somewhat lower than the desired one but, if the relation of the reading be constant, an equally useful and true indication is assured. Likewise, handling of individual burners may be eliminated, assuming of course, that provision is made to proportion the air for combustion by the use of a master valve to control the fuel to all burners, using the individual valves on these burners simply to distribute the heat in the fire box; thus a modification of the control fuel valve will affect all burners equally, and maintain approximately even conditions in the fire box under all rates of firing. The flow to the coil may be maintained constant by metering the charge through the control house or by the speed of the charging pump, and the fuel main may also be maintained at constant pressure by the use of a reducing valve on the line.

AS A matter of fact, in many instances, it is desirable to substitute a reducing valve for the master valve serving all the burners and provide a gage on the burner header. The fireman may then definitely effect increments of pressure, and reduce the inaccuracies which may be due to even slight fluctuations in the main, or those due to handling a valve by adjusting the position of the

stem to make corrections. His regulating control of the temperature of the furnace is essentially the pressure on the burner header, which bears a more direct relation to the temperature at the outlet than the position of the stem on the master valve. The control of the furnace is thus effected by observing the reading of a pyrometer, which bears a definite and constant relation to the outlet temperature, and making changes on the reducing valve which will be reflected by increments in the pressure gages on the burner header.

In a more complete apparatus the matter of reducing the number of variables is obviously more difficult, and it becomes necessary to subordinate secondary regulating controls, in order to effect regulation with the one which has the greatest influence on the operation.

In this connection, let us consider the operation of a simple topping unit where the crude oil is pumped to and heated in a coil, separation of the various fractions is made in a separating chamber and a fractionating tower, and the products from the tower are condensed in the usual manner. We are primarily interested in extracting the maximum amount of gasoline from the crude, producing a tower bottom of proper flash, let us say gas oil, and a residual bottom of reasonably uniform quality. These separations depend primarily on the amount of heat imparted to the oil and the cooling effect in the separating chamber and the tower.

The cooling effect in the chamber depends largely on radiation and evaporation, while the cooling effect in the tower, although dependent on radiation and evaporation, is more affected by the reflux pumped back to control the quality of the overhead product. The main disturbing elements are, obviously, the variable radiation and the inaccuracies due to handling the equipment.

Tower Temperature Important

IF WE consider that the overhead from the tower is the primary product and that the quantity and quality of this product determines the success of the operation, it will be evident that the temperature at the top of the tower will constitute the control indicator to determine the quality of the product, and that the quantity of overhead obtained from the apparatus will depend largely on the heat in-put to the tower which will constitute another indicating control. It is also evident that the variation of these factors, to obtain proper control, must be limited and their regulation must be related. The heat in-put to the tower is, obviously, the most important variable and will dominate the control of the temperature at the head of the tower.

Leaving out the effect of a reboiling coil, which may be used in the tower to strip the bottoms, we then become concerned more essentially with the quantity and temperature of the liquid and vapors leaving the coil, which is the source of heat.

The uniform in-put of heat into the tower is of utmost importance. To insure this, the flow of charging stock through the coil must be maintained constant and may be done by metering the charge in a suitable manner, and the temperature at the outlet of the coil must be maintained within as close a limit as possible; in other words, the rate of flow through the coil and rate of firing must be maintained in relation to each other and, theoretically, they should both remain constant. This, of course, is not possible, since variations must take place and one or the other factor must be made a variable to effect regulation in order to approximate the ideal conditions, and compensate for changes beyond control.

It has generally been found more desirable to alter the rate of firing and maintain the flow constant, as this method of operation gives regulation with the least general disturbance. The regulation of temperature, maintaining the flow constant, can then be effected by the fireman in a similar manner to that previously described, and the means of regulation can be made responsible for the overall result after other secondary controls have been adjusted to the rate of firing. The constant changes in atmospheric conditions and other factors necessitate a secondary regulation on the tower, which will vary the amount of reflux within a limited range, to control its outlet temperature. This variable, however, should be utilized as little as possible and if stress is laid on the uniformity of in-put of heat to the tower, better fractionation will be accomplished and a greater capacity will be obtained. It is unreasonable to expect that tower regulation can compensate for major variations in heat in-put and, in many cases, failure to hold the temperature of the top of the tower may be traced to this fact.

Heat In-put Should Be Uniform

IF THE temperature at the top of the tower be maintained accurately in spite of fluctuations of heat input, a considerable disturbance will ensue in the tower, caused by the large variation in reflux, and will affect the accuracy of fractionation and tend to reduce the capacity.

The foregoing examples are, to say the least, elementary but they are cited in an attempt to illustrate the type of things which must be considered in connection with control work and to suggest a method of approaching the problems involved.

In refinery practice it is not always a simple matter to make a choice of variables, either for indication or control, since their effectiveness may be reduced by design, operating methods, or the combination of parasitic variations of auxiliary equipment.

Surveying the chief requirements which permit control, we might say that the successful control of equipment in general depends, primarily, on correct design, because it is in design that the greatest result can be achieved in eliminating disturbing variables and in turning a difficult control problem into a single one; it depends on the proper choice of variables, both for indication and regulation, and on the choice of the best possible balance between the factors of time and simplicity; it depends on the careful and systematic regulation of all variables affecting indirectly the finished product and which cannot be eliminated by design; and last, but not least, it depends on the realization that accurate control means greater returns and that some sacrifices are warranted to obtain it.

Apparatus Should Be Well Designed

IN GENERAL, apparatus to carry out a certain process must be so designed as to make control possible, and further, the method of operation chosen must be such that the control features are fully capitalized. It is, too, often possible, by skill of operation, to make up for certain defects in design, but this operating skill obviously should be employed to obtain maximum results and not to overcome avoidable faults. The matter of control is usually given a good deal of consideration with regard to the disposition of equipment, valves, etc., although not always in the right direction, and such consideration is often encumbered by customs initiated in obsolete apparatus. Improvements in control are almost invariably possible, in practically all types of refining equipment, if this feature is emphasized and the limitation of instruments is taken into consideration as well as that of the apparatus.

The largest part of refining practice deals with heat treatments and almost all the other factors encountered, such as pressure, etc., result from heating the stock to be refined. It is not surprising, therefore, that in almost every case, regulation of the application of heat is the most important factor in operating control to which all others may be subordinated. In any distillation or heat treatment, every effort should be made to facilitate the control of the rate of firing, and other variables, encountered in the carrying out of the operation, may be generally considered secondary and adjusted to it.

A NEW MEASURE OF INSTRUMENT VALUE

THE
FOXBORO CO., INC.
GUARANTEES TO REPAIR OR REPLACE, FREE OF CHARGE FOR ONE YEAR FROM DATE OF SHIPMENT, ANY INSTRUMENT THAT DOES NOT PROVE PERMANENT IN CALIBRATION AND FREE FROM DEFECTS IN WORKMANSHIP AND MATERIAL.
BEFORE REMOVING THIS SEAL
READ THE GUARANTEE AND INSTALLATION INSTRUCTIONS.
FINAL INSPECTION
BY 241
FOXBORO
REG U S PAT OFF

Foxboro Performance is a KNOWN QUANTITY. That's why it can be guaranteed.

HERE is a definite pledge which establishes a new measure of instrument value. It is the Foxboro Guarantee of permanent calibration, workmanship and materials sealed to each recording and controlling instrument.

This sealed guarantee is tangible evidence that the instrument is capable of performing the work for which it is designed.

If it were not for the years of technical research, the accumulation of practical knowledge of instrument requirements in many industrial fields and the perfection of details to meet these varied requirements, such a guarantee would not be possible.

The superior accuracy and performance of Foxboro Instruments have been demonstrated for years in the petroleum industry.

When you need accurate and dependable instruments of KNOWN QUALITY, write or wire our nearest branch office.

The Foxboro Company

Neponset Avenue, Foxboro, Mass., U. S. A.

205 So. Cheyenne Avenue, Tulsa, Okla.

New York Chicago Boston Philadelphia Pittsburgh Cleveland Rochester, N. Y. Atlanta Los Angeles
Detroit San Francisco Portland, Ore.

FOXBORO

REG. U. S. PAT. OFF.

THE COMPASS OF INDUSTRY

INSTRUMENTS FOR INDICATING, RECORDING AND CONTROLLING TEMPERATURE, PRESSURE, HUMIDITY AND FLOW

The regulation of flow of fluid through a system is of prime importance in continuous processing, but it differs in its application from that of control of heat input, in that it is not necessary to utilize its variation to the same extent to compensate for the changes.

Equipment required for constant flow, such as constant volume pumps or meters, has not proved entirely satisfactory and there is much room for improvement in this field. For lack of a better means, the use of pumps in tandem is often useful, since the high pressure pump can be made to operate on a comparatively small pressure differential, reducing the slip and permitting more accurate stroking. This is, obviously, a crude approximation of the desired result and in the future, doubtless, pumps will be supplied with governors on the output in much the same manner that a steam engine is supplied with a governor for speed.

Some Variables Unavoidable

OF THE many variables which have to be contended with in the operation of a process, the effect of many are unavoidable. There are some, however, which complicate the problems of control and which could be eliminated if sufficient importance were attached to its accomplishment. Probably the worst offender in this is variable steam pressure, which is encountered in almost every refinery.

In most cases, the charging pumps in refinery equipment are operated by steam and, needless to say, variations in steam pressure cause fluctuations which have to be corrected either by hand or by such devices as may be used for this purpose. It is evident that fluctuations in steam mains are undesirable and it can hardly be said that they are caused voluntarily. It is almost universally true, however, that pressure variations occur at various periods during the day in a refinery, and that they are particularly severe in winter time. They can be eliminated by the proper use of reducing valves but, in many instances, insufficient drop in pressure between the main line and the charging pumps defeats the corrective action. In this connection, it is sometimes useful to substitute a reducing valve for the throttle valve on the pump, which permits the valve to operate under greater pressure differential, since the low pressure side is on the steam chest proper and its use permits setting up a definite and constant pressure on the pistons.

There is probably no portion of a refinery which is more overloaded than the steam plant, since equipment is increased from time to time, building up load on the boiler plant little by little, until it finally results in sufficient shortage of steam to cause fluctuations in the mains. These fluctuations are multiplied by the ratio of the steam to the oil cylinders, and operations, which would normally be stable and uniform, are rendered troublesome.

It should be clearly borne in mind that when putting in expensive additions to equipment, adequate steam supply will permit the new equipment to produce better returns by the avoidance of fluctuations. An overloaded boiler plant invariably means poor control.

Another source of trouble, which appears to be common, lies in the fact that a refinery is usually required to burn whatever fuel oil happens to be available and, in some plants, even sludge fuel is mixed with the fuel oil and burned under the stills. Variations in fire will often result in appreciable decrease in capacity and quality of products, and it should be a question of serious consideration whether a better grade of fuel would not pay, at least in some of the more delicate operations, in view of the improvement in control. Probably the least trouble from poor fuel oil would come by burning it under the boilers if a little excess capacity were available to absorb fluctuations.

The use of automatic devices to effect control will, undoubtedly, take the place of hand operation more and more in the future. The use of these devices will require the same consideration as that which should be given in facilitating hand control. They should be, of course, capable of a wide range of control, but we should endeavor to limit their action to the smallest possible variations. It should be borne in mind that any regulating control that is working, disturbs the operation of the whole, and that best results are invariably obtained from apparatus when it is in balance and requires no adjustment. Perhaps their most important function should be to find this balance quickly and maintain it with the least effort.

The function of an automatic device is, essentially, to reproduce, if not to improve, human action and, in any case, the detail of its action is closely parallel. It has, of course, the advantage that its operation is continuous and that nothing save failure can disturb its appointed method of doing its work. It has no other interest, beyond that for which it is intended, and may combine, in its effect, recognition of several changes in the apparatus, always interpreting and counteracting them in the same way.

A great deal of knowledge exists in the physical principles which underlie instruments and their action, and the suspicion with which instruments of automatic devices have been looked upon, is warranted only by the fact that many times instruments are improperly used or not developed to operate under conditions imposed. A clearer realization of the purpose for which they are intended will bring about the development of far more suitable instrument equipment. A large part of the problem of fostering this development is encumbent on the refiner.

Four Phases To Control

MOST refinery operations can be carried out with four general types of automatic devices; temperature control, flow control, level control and pressure control. A great deal of work has already been done on temperature control and this problem appears to have been solved for the present. Some satisfactory flow control and level control devices have been developed but their use is not yet as extensive, and, although these are, comparatively speaking, of less importance, they will be required more and more in the future. Many existing pressure devices are very satisfactory for certain classes of work, but some new types are required to perform the duties of expansion valves with more accuracy and reliability and be capable of operating under high temperatures. It is expected that apparatus of this character will be available shortly for commercial installation.

The control of equipment is largely based on the transfer of motion at a distance, and many of the devices at present in use have employed air, steam, liquid and electricity as motive power to transfer these motions. Those who have operated refineries in cold climates would, doubtless, be able to give a vivid description of the troubles attending the use of air and steam; and those who have used hydraulic systems for transmission of power could also recite tales of woe.

The solution of most remote control lies in the use of electricity, since cables can be properly safeguarded, and if an installation be properly made, it is capable of more reliability than other systems. The difficulty in connection with electric transmission of motion has been due chiefly to failure of motive power and contacts, and complicated mechanisms to carry out the required motions. Power failures however, may be eliminated by making provision for auxiliary generators, under-ground conduits and armored cables. Contact difficulties can be practically eliminated by the use of alternating current and better relays.

With regard to the mechanism for the transmission of motion, it is interesting to note that an electrical

system of transmission of motion, which has been in existence for about 14 years, has been adapted to some of the uses suggested above and is available and can be developed to adapt itself to almost innumerable applications. The particular system comprises a pair of motors connected with four wires and energized with single phase, alternating current. The armatures of both motors are always in phase and the motion of one will affect the motion of the other within remarkable accuracy. These motors, developed by the General Electric Co., were first used on the Panama Canal to reproduce the position of the locks. They have since been used in connection with the fire control equipment on battleships and engine-room telegraphs and various types of indicators.

When it is realized that a slight motion of the armature of one of these motors can be transmitted to any number of points, at practically any distance simultaneously and accurately, we can well imagine the possibilities that such transmission will have in refinery equipment. They can be used to operate valves in remote places and record their position, transmit level indications and pressure readings at a distance without danger of failure in lines, and doubtless the adoption of this principle in time will effect material changes in design by giving more freedom in position of control valves and equipment, which must now be placed in such manner that they have to be handled manually.

In the foregoing, an attempt has been made to generalize on physical control of equipment, but obviously, the subject is so broad that only the salient features can be touched. It really represents a new phase in refinery engineering, and the study and application of the principles of control will go a long way toward making available the economies which have been sought in the design of modern equipment. This phase of refinery engineering must be taken seriously, it must be realized that it is distinctly a specialty, that reasonable concession should be given to improvement of control when undertaking new designs, and efforts should be made to modify existing operations and equipment to make adequate control possible. There is no field of refinery technology which offers more interest, and none which offers so much return to the refinery for moderate expenditures.

Reeves To Represent Deepwater

HOUSTON, Feb. 20.—F. L. Rogers, sales manager of the Deepwater Oil Refineries, Inc., announces that C. J. Reeves, formerly of the Keen & Woolf organization at Houston, will represent the Deepwater in Texas, Oklahoma and Arkansas territory. Mr. Reeves is widely known in jobbing sales circles.

THE OBLIGATION WE OWE YOU—THE CUSTOMER

One thought deeply graven in the minds of our organization this year is volume. To make every square foot of our great new factory resound with the riveter's hammer and glow with the welder's torch, to materially increase sales volume, we have bent the coordinated strength of each person within our gates.

Our purchasing power of raw materials, our heightened efficiency through studied methods and new machinery, our ability to deliver promptly, and greater perhaps than all the others, the fidelity of our guarantee, should direct your thoughts to "Youngstown" this year when you are considering steel storage.

That we will honor the confidence you place in us is testimony of years past.

The Youngstown Boiler & Tank Co.
Youngtown, Ohio
Offices in Principal Cities

Youngstown TANKS "KEENE STANDARDIZED MADE"

Gasoline And Other Motor Fuels

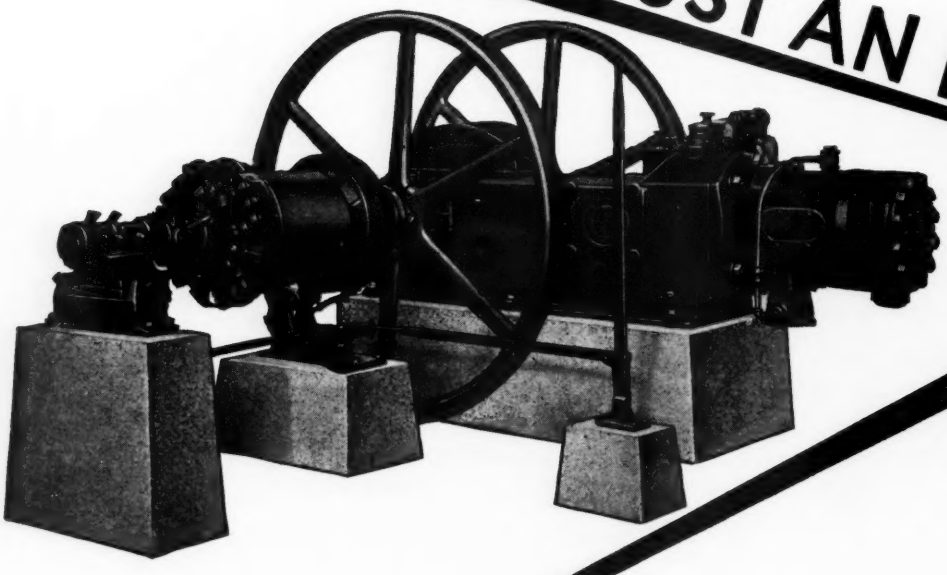
by Ellis and Meigs, is a book which gives a complete survey of the field and a description of practically every process of making gasoline and most other motor fuels of promise or prominence.

The price of the book is $10. Just send us your check and we will mail a copy of it to you.

National Petroleum News, 1213 W. Third St., Cleveland, Ohio

NATURAL GASOLINE
Grades A · AA · B · BB · C
CONTRACT OR SPOT
WILLOCK OIL CORPORATION
First National Bank Building · Phone Atlantic 3110
PITTSBURGH, PA.
52 Years Experience · It Counts

MORE THAN JUST AN ENGINE



THE Bessemer Oil Field Engine is not merely a gas engine—it is a perfected power plant developed and built exclusively for oil country service. Feature by feature this Oil Field power source has been engineered and fabricated specifically to meet the rigid service requirements of operation under every conceivable field condition.

It is entirely enclosed—yet all parts are quickly and easily accessible. All moving parts will wear for years, but adjustment has been provided on all parts subjected to hard wear so that their years of service are materially lengthened. They are over-strength—yet excessive weight has been avoided. Their simplicity means less maintenance cost, and their long, uninterrupted service means less depreciation and consequently a lower power cost per working hour.

Judged from any angle, the Bessemer Oil Field Engine is a super power-plant for oil country service—unmatched in performance, outstanding in economy and the leader in investment value.

Watch it in operation, examine it closely, then judge for yourself. Also built in the 4-Cycle Type.

THE BESSEMER GAS ENGINE COMPANY
70 York Street ∴ ∴ ∴ ∴ Grove City, Pa.

BESSEMER

BESSEMER OIL FIELD ENGINES – COMPRESSORS VACUUM PUMPS – ROLLER PUMPING POWERS

Many Advances Last Year in Technic Of Production Engineering

By J. B. Umpleby*

Presented before Petroleum Division, A. I. M. E., New York, Feb. 20-23

PRODUCTION engineering in 1927 may be characterized by a great clarification of fundamental conceptions, and many improvements in technic. During the year the profession has received marked recognition by the industry and to an extent never before attained has become an integral part of it.

Petroleum Production Engineering is a new profession. Prior to 1925, when this Institute undertook the work, no forum existed for the open discussion of its technical problems. There was no attempt at a handbook of the subject prior to "Petroleum Production Methods" by J. R. Suman in 1921 and no text book prior to "Petroleum Production Engineering" by L. C. Uren in 1924. As late as 1926 only six schools and universities offered special courses in petroleum production engineering. Prior to about 1923 engineers engaged by oil companies were used almost exclusively for construction and location work. Two of the leading production engineers in the Mid-Continent, although with their respective companies more than twelve years, were not definitely assigned to production work until 1924. Both men now head large departments giving their entire time almost exclusively to production problems.

Because of the newness of the profession the leading production engineers of today have had their fundamental training in mining, civil, mechanical and electrical courses. Not unlikely this diversified training is in considerable part responsible for the amazing growth of the profession that we are witnessing. I believe, however, that this recognition is due principally to economic pressure within the industry focusing attention more and more sharply on costs and efficiency. After all, the justification for the growth and continued development of the profession is to recover more oil from a given unit of sand at less cost per barrel. As a new profession it seems to me that greatest progress will result by focusing thought and effort on this single objective, and if I might offer one suggestion to the committee for 1928 it would be to get more cost data into the records than my committee has done.

A crying need exists for a handbook combining data pertinent to our work. Who has not searched from the Smithsonian Physical Tables through the various engineering handbooks to the supply house catalogs for some necessary data? I am not sure that if members of this organization gave it their support it would not be possible to get the Petroleum Division of the A.P.I. to undertake this task. The first edition might be prepared in a stated time, frankly admitting incompleteness and counting on later editions and criticisms to attain the objective. It might be possible, if properly presented, also to get a part of the funds available for fundamental research in petroleum physics directed to a determination of formulae greatly needed in air-gas lift and gas energy studies. Surely the determination of reliable constants that may be used over and over again may be classed as fundamental research.

Most of the problems confronting the industry have engineering phases. Among the live issues at present are waste, unit operation, utilization of gas energy, well spacing and repressuring.

Press and technical journals contain many assertions and denials that waste exists in the oil industry. Both contentions have merit depending on the definition of waste. Incident to physical operation there is remarkably little waste but from the standpoint of economic control there is tremendous waste. The loss of fluid from the time a natural reservoir is tapped to the point of delivery of gasoline to the tourist or coke to the householder is remarkably small. The economic losses incident to excessive competition are excessively high. One kind of waste means depletion of resource and hence higher prices to the consumer ultimately—the other means this and in addition thereto, higher prices currently. The oil industry supports too many people. Consider the number of filling stations, the number of lease brokers, scouts and branch offices, the number of drilling contractors, casing crews, teaming contractors and rig builders, mostly part time employes. If employment were steady probably half the number could do all the work at half the cost. The reason for this is too much and too keen competition. That competition necessarily reduces cost to the consumer is a fallacy. In the oil industry it greatly increases cost which can only be passed on to the consumer ultimately.

EXCESSIVE competition often finds expression in too rapid development of new fields, a disregard of the broader requirements of the industry at a particular time, too many filling stations, too many refineries, in many cases too close spacing of wells, development under unnecessarily adverse conditions of transportation, unnecesary employment of inefficient labor, too large a rental and bonus cost on protection acreage, too much storage on top of the ground, instead of reserves in the sand, and, probably more important than all from the standpoint of conservation, failure to use to a maximum in producing oil the

DEVELOPMENT of the air-gas lift is the outstanding engineering accomplishment in the producing industry in 1927, in the opinion of Dr. Umpleby, author of the accompanying paper. "Problems incident to its use are corrosion, simplification in design to afford lower cost and a further knowledge of fundamentals to the end that specifications for any particular situation may be predetermined with greater assurance," he said.

Well spacing is another major problem which has received attention, he pointed out, urging engineers to study the theory advanced by Prof. L. C. Uren, head of the petroleum engineering department of the University of California, that, under certain conditions, ultimate recovery of oil will be greater for widely spaced wells than for closely spaced wells.

Most of the problems confronting the producing industry are engineering in character, Dr. Umpleby said in outlining such co-operative work for production engineers to undertake as fundamental research in gas energy and development of a handbook on petroleum engineering.

*President and general manager Goldelline Oil Corp., Oklahoma City, Okla.

gas energy that accompanies it in nature.

Thus economic waste in the oil industry is tremendous, although resource waste is negligible. Waste lies chiefly in the fields of competitive finding and acquisition, competitive development and competitive marketing. Most costly of these is probably competitive development and as this is primarily the field of the production engineer he cannot refrain from taking interest in it. He cannot give too careful study to problems of well spacing, defensive drilling, gas energy utilization and the physical problems of unit operation.

Unit operation has so many advantages in so many fields both to the consumer and to the industry that it or some equivalent is bound to come on an increasing scale even if revision of law is necessary to make it possible. Working out of details will involve largely information and conclusions to be supplied by the production engineer and he should prepare himself in every way possible for the call. The engineer's part in a unit operation will probably be a continuing one because any contract must, from our present knowledge, leave wide discretion to the operating committee and many of its problems will involve gas energy relationship.

Gas Energy

DURING the past year the conception of gas energy has displaced in large part the old conception of gas oil ratio. It is erroneous to measure production efficiency by the volume of gas that accompanies a barrel of oil, because volume increases in effectiveness as an expellent of oil as pressure increases. The true measure of efficiency is the degree of effective utilization of energy stored in the reservoir, hence, the new term, gas energy. If the relationship of gas energy consumed to oil produced is to be taken as the measure of operating efficiency a vast field of research is opened. Clearly the amount of energy necessary to move a barrel of oil a given distance will vary with the character of the oil and reservoir rock. To get a measure of these several variables will require much fundamental research in the field of viscosity, oil composition, character, composition and size of sand grains and composition of gas in addition to pressure, volume and temperature determinations. I conceive, however, that the time will come when we can analyze bottom hole data and compute for a particular situation the optimum of operating efficiency. Certainly the field is alluring and worthy of investigation. It seems to me that such work should properly be classed as fundamental research in physics.

The idea of conserving gas energy has led to notable achievements during the year. In the Ventura avenue field in California, careful study of production and elimination of certain wells has effected a reduction said to be around 25 per cent in gas blown into the air without seriously affecting production. This is a remarkable example of what can be done by cooperation in a closely drilled field of diversified ownership.

Well Spacing

Well spacing has received much attention during the year largely because many believe that wider spacing at Seminole would have yielded more profit without breaking the oil market. Well spacing is largely a matter of the balance sheet and it has been generally held that the closer wells are spaced the greater the recovery per acre. At our Fort Worth meeting, however, Prof. L. C. Uren advanced a contrary view. If his contention is correct it will have a revolutionizing effect on the industry. Uren contends that most of the gas energy is consumed in moving oil the last ten feet toward a hole because of the converging lines, hence faster rate of flow. He concludes, "Providing the wells are not spaced beyond the oil-drainage radius of each other, the fewer the number of wells used, the less rapidly will the oil be drained, and because of the lower average rate of flow of fluids through the sands, the energy consumption per barrel of oil produced will be lower. Hence, the ultimate recovery of oil will be greater for widely spaced wells than for closely spaced wells." His contention is supported by laboratory experiments which, although not fully convincing because of the limitations of the equipment, are highly suggestive and warrant much careful field observation, particularly where town lot areas comprise parts of pools.

J. H. Gardner has pointed out the adverse relation between close spacing of wells and the balance sheet at Seminole and T. B. Slick recommends developing one Wilcox pool on the basis of one well to 40 acres as an experiment.

To this may be added another thought. If the first generation of wells throughout any pool are drilled on 40-acre locations production peaks will be lowered, storage building programs reduced and excessive costs due to rapid development averted. The greatest advantage, however, will result from a determination of the limits of the pool and the merits of its different parts. In places, such as parts of Hutchinson county, Texas, further wells would not be drilled and in others such as Burbank, there would probably be a second generation of wells on 10-acre locations. In the former case the saving is obvious and in the latter case the fifth or central well would pay a profit as an intake for gas in the maintenance of pressure. This fifth well could be produced until the 10-acre locations were drilled. Time will not permit further development of this plan but I believe it can be worked out by agreement between lessees without doing injustice to the royalty owner, the small or large operator, and without justifying opposition by the department of justice or the state conservation commissions. It seems to have many of the advantages of unit operation and to avoid many of the difficulties.

Repressuring

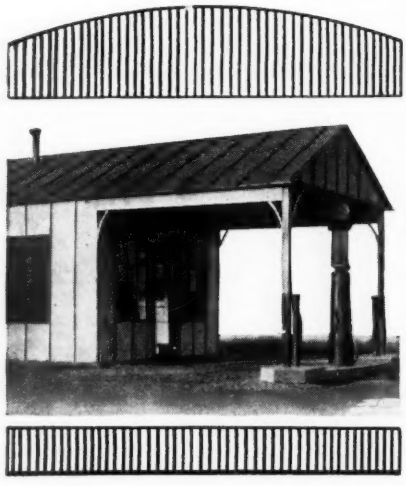
REPRESSURING, by the injection of air or gas into partly depleted sands, has not expanded in 1927 as it did the two previous years. Periods of over-production do not encourage this sort of activity but the idea of pressure maintenance, which might better be called energy maintenance, has received much attention. This has gone hand-in-hand with a clearer recognition of energy relationships in the sand. Energy may be maintained by maximum utilization in production and by injecting compressed gas or air through central wells; by not allowing gas to escape unduly at the front of the column and by adding it at the rear of the column. The injection of gas or air through central wells early in the development of a pool seems to be sound in theory and practice and will undoubtedly come into much more general use. It is now being done using pressure up to 1200 pounds. Closely related to it is the use of old fields and parts of fields as storage reservoirs for gas in order to avoid the construction of steel containers by gas distributing companies. This is receiving serious attention in California.

Development of Air-Gas

Turning from general problems to concrete accomplishments, the development and utilization of the air-gas lift in 1927 is outstanding. This method, known and used for more than a generation, came into prominence in handling deep production from crooked rotary holes in California in 1926. Its greatest development, however, resulted from application in Seminole during 1927. At the beginning of the year it was a try and fit method with few of its principles understood. At the close of the year many of the principles were known and the data necessary for the determination of others were clearly recognized. More important than this advance, however, is the fact that a large group of engineers and operators have become acquainted with the method, thus insuring its further use and development. Application is at present limited to larger wells be-

Not to take advantage of the scientific methods of drilling and cementing that caused the overproduction at Seminole is to pass up the very first step in true conservation. Oil can never be brought to the surface that is wasted underground. In the interest of our national petroleum resources, the methods used to prevent waste at Seminole should be extended to all the fields of the United States.

HALLIBURTON OIL WELL CEMENTING CO.
Duncan, Oklahoma



Better Looking
LOCK-JOINT
STEEL STATIONS

Among the *exclusive* advantages offered by our steel buildings of the new LOCK-JOINT construction are a more handsome appearance, with neat, trim exteriors and smooth, flat inside walls.

Other features are absolutely weather-tight joints in walls and at eaves, the rigidity imparted to walls, and the elimination of bolts in joining sheets together.

Erection is easy and rapid. Durability is insured by the materials offered—either TONCAN Metal or copper-bearing steel sheets, galvanized for additional resistance to rust. Ask for full details on Lock-Joint Steel Stations, BRADEN Sectional Buildings for bulk stations, etc.

BRADEN STEEL & WINCH COMPANY
Gen'l Offices and Plant: Tulsa, Okla.
Oklahoma Distributors for TONCAN Products
Gulf Coast Representatives: Texas Steel Bldg. Co., Houston

BRADEN BUILDINGS

cause of the cost of installation, but it is surprising what small wells can be handled profitably once the plant is in. In fact, some of our leading engineers believe there is no point at which it pays to take a deep well off the air and put it on the pump. Because of the excellent control of back pressures afforded by the air-gas lift, reduction of the problems of well maintenance and its advantages over pumping in crooked holes, it seems that a wide expansion in its application is imminent. Outstanding problems are corrosion incident to its use, simplification in design to afford lower cost, and a further knowledge of fundamentals to the end that specifications for any particular situation may be predetermined with greater assurance.

Closely parallel to the development of the air-gas lift has been an increased understanding of the significance of gas oil ratios. The amount of gas accompanying a barrel of oil from any well gives an excellent measure of the comparative efficiency of operation from day to day of that particular well. In the light of our increased understanding of the relation of gas volume to gas energy and of gas energy to oil production care should be exercised, however, in measuring on this basis the relative efficiency of operation of different wells and more especially of different fields. In different pools and in different parts of the same pool maximum efficiency may be represented by widely different gas-oil ratios.

DEEPER drilling has led to many improvements in drilling equipment. Most of these have been in the direction of increased weight and strength, but much attention has been given also to reducing friction. Rotary drilling is being more widely employed and in many places rock bits are used from the grass roots down. An increasing number of wells are completed with rotary tools. The increased weight of equipment is shown by the common use of three 90 horsepower boilers carrying 200 pounds of steam against two 45 horse-power boilers carrying 100 pounds. The compound slush pump, more careful selection of materials for rotary mud, automatic feeds, differential controls, better bits and coring devices and the introduction of roller and ball bearings in many parts of the equipment are noteworthy advances. There seems to be a tendency away from steam power to internal combustion engines and electricity. Full diesel, multiple cylinder, vertical engines are now available in 125 horse-power sizes. This movement is prompted by an urgent need to reduce fuel cost in drilling wells.

In the field of pumping wells the double reduction gear unit and the long stroke pump have become more common. The latter makes it possible to ease the shock at the end of the stroke and by less frequent changes in tension to reduce sucker rod fatigue. It also compensates for the stretch in rods in very deep wells. The quality of material in sucker rods has been greatly improved and much study given to the best design for box and pins. Sucker rod guides either of wood or brass as a means of reducing friction and protecting tubing have come into general use in some fields.

In operating shallow wells attention has been directed toward reducing the gas factor by raising tubing and by pressure regulating valves on the gas discharge line. The use of individual well powers in territory where electricity is available has increased. Some of these are placed between two wells in order to obtain the advantages of a counterbalance while doing useful work. The installation cost per well of these units compares favorably with that of band wheel powers. The problems of peak load and proper counterbalancing has caused much study of strength and weight of materials. The use of dynamometers for the study of sucker rod strains and stresses has led to improvement in material and design of rods, standing valves and working barrels in addition to putting pumping technic on a more scientific basis.

Standardization

This review would not approach completeness without reference to the work of the standardization committee of the American Petroleum Institute, which although in progress for several years, was largely completed in 1927. It is said that "specifications have been completed on 90 per cent of the equipment used in the drilling and producing of oil." The extent of this activity may be realized if it is recalled that the sizes of joints and styles of rotary and cable tools, derricks and rig irons have been reduced from 626 to 33. In this entire program, which can only mean millions of dollars saved to the industry, engineers have played an important part.

The year 1928 finds the petroleum engineer in a vastly improved position for development and service. In the petroleum division of this Institute he has a forum for free discussion of engineering problems and the development of new technic. In the American Petroleum Institute he has an avenue for converting accepted theory into common practice. In this organization the engineer speaks as an individual; in that to a considerable extent as a representative of the industry. This is primarily a fact finding group; that a fact using group. This is essentially a scientific organization; that a trade organization. With these two avenues, one for the development of technique and one for effecting its adoption, petroleum engineering is in an enviable position and great should be its influence in the industry.

More Sales Effort Needed to Market Fuel Oil Against Other Fuels

By Arthur Knapp*

Presented before Petroleum Division, A. I. M. E. Annual Meeting, New York, Feb. 20-23

Analyzing Fuel Oil Situation

STOCKS of fuel oil are piling up rapidly, Mr. Knapp points out, and even though more industries are sold on this fuel as against coal or gas, improved efficiency of operation is a force constantly working against increased consumption of fuel oil.

"It is evident that the sales of fuel oil must be accelerated until they can keep pace with the other petroleum products. An increase in gasoline and kerosene sales would accomplish the same result to some extent through the elimination of some of the fuel oil by cracking," says Mr. Knapp, adding that increasing sales of those products seem to hold less promise than sales of fuel oil itself.

He emphasizes that, to bring this about, more attention will have to be paid to competition outside the oil industry than to intensive competition within it and that research work may be necessary to develop new uses for the heavy oils.

THE economics of fuel oil must be considered in two aspects; viz., fuel oil as one of a number of competitive fuels and fuel oil as a refined product of petroleum.

"Fuel Oil" is usually defined as that product of petroleum which is used in furnaces for the generation of heat by simple combustion. It is true that any product of petroleum used in an internal combustion engine is essentially a fuel oil, but such oils are not included in the class known as "Fuel Oil."

For a number of years, the petroleum industry has believed that the petroleum reserves were very limited and that petroleum products would begin to become scarce within a few years. The industry has believed that there would be a gradual but continual rise in prices as a result of this impending scarcity.

The industry, therefore, has informed the users of fuel oil that, once they were eliminated by price, they were eliminated for all time. The petroleum industry believed and made the consumer believe that there would never be any appreciable recession in price which would make it worth while for any consumer of fuel oil to resist elimination with the expectation of future lower prices.

The effect of this attitude toward the future of the fuel-oil market is shown by the trend of consumption of fuel oils by the railroads and by public utility power plants generating electric power. This consumption has declined.

The decrease in the fuel oil used may be partly the result of increased efficiency of use. If the price of fuel oil alone was the factor governing the major portion of the decreased use, the curve of consumption should bear some relation to price. However, the major influence has been the fears of the consumers that fuel-oil prices would continue to rise, and they have offered no resistance to elimination as fuel-oil users as soon as the price became too high.

The railroads have had the same feeling regarding the fuel-oil situation as have the public utilities. The increase in the efficiency of use, which has been brought about by the railroads, would have built up considerable resistance against elimination had the railroads been given reasonable assurance that price recessions might be expected.

The railroads and public utilities producing electric power together consume at least a quarter of the fuel oil marketed. They have a common problem of purchasing. They cannot make immediate adjustments of the selling prices of their services and are, therefore, primarily interested in a stable market. They require long-time contracts and these are the principal reasons why they have been more interested in coal than in oil.

Another 20 per cent or more of the fuel oil produced is consumed as bunker oil. The intensive competition to be found in ocean transportation, coupled with the slowness with which it is possible to adjust ocean freight rates, make it imperative that shipping companies shall also have a stable fuel market.

ANOTHER 10 per cent of the fuel oil produced appears in the statistics as exported. The greater part of this is also used in vessels and may be considered under the heading of bunker oil.

In other words, over half of the fuel oil is sold in competition with coal and gas, not only on a cost basis, but also on the basis of stable markets and long-term contracts.

The petroleum industry uses at least one-eighth of the fuel oil produced. Even in this use, coal is sometimes a competitor and gas is coming more and more into use, to the elimination of fuel oil. Petroleum coke is also a competitor.

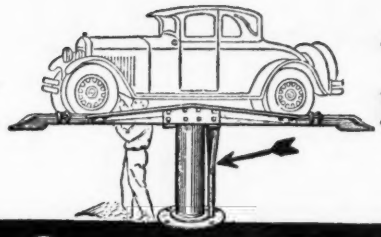
About 16 per cent of fuel oil is consumed without severe competition at the present time because of its superior qualities in heat treating, smelting, cement burning, etc. This is a passing phase, as gas and powdered coal are being developed and will be serious competitors of fuel oil, particularly in large plants. The plant investment required for gas production or powdered coal use has been a handicap which is being overcome.

Of the remaining 20 per cent (approximately) the gas companies consume about 6 per cent in the production of manufactured gas. The manufactured gas industry as a consumer is gradually being eliminated by improvements in process. These improvements are the result of research under the threat of a continual increase in price.

ABOUT 4.5 per cent is used for heating houses and office buildings. Coal is not a serious competitor of fuel oil for heating office buildings, because of the extreme convenience of oil as a fuel. For dwelling houses, coal is always a competitor except for those who can afford to pay for the convenience of oil fuel. Domestic gas is coming more and more into the field and as soon as gas distributors can find some

*Petroleum Engineer, The United Gas Improvement Co., Philadelphia.

"Quick Service"



"Big Profits"

Safety Lift

16 Beaver Street. New York City

GULF Refining Company

General Sales Offices
PITTSBURGH, PA.

District Sales Offices
New York, Houston, Atlanta, Boston, New Orleans, Tampa Philadelphia, Louisville

REFINERS OF OKLAHOMA TEXAS AND LOUISIANA

PETROLEUM

REFINED OIL
GASOLINE
NAPHTHA
GAS OILS
PARAFFINE WAX
PETROLEUM COKE

Fuel Oil--Lubricating Oils

CYLINDER ENGINE
CORDAGE

RED AND PALE PARAFFINE OILS

economic solution to the problem of overload which gas house-heating produces, domestic gas will be a serious competitor of fuel oil for heating dwellings.

Fuel oil occupies a unique position among petroleum products since it is, in general, the residue of refining operations. It is also unique in that increased efficiency within the industry nearly always results in a decrease in the consumption of fuel oil. The use of gas under field boilers and the electrification of drilling and production operations result in fuel-oil economy. The use of refinery gas under stills and the introduction of heat exchangers result in further fuel-oil economy. The use of internal combustion engines for drilling, pumping wells, pipeline pumps, and tanker propulsion, all mean less fuel oil consumed.

Only one thing has worked toward a decrease in the fuel oil available for marketing, and that is cracking. The over manufacture of gasoline has been so extensive and so prolonged, however, that the economic balance between output and prices of gasoline and fuel oil has never been established.

The trend of the ratio of fuel oil price to gasoline price in Group 3 territory during the past five years is upward, showing that fuel-oil prices have consistently increased as a proportion of gasoline prices over this period. It is doubtful if the economic relation of these prices is a proportion. It is more probable that it is a difference.

Previous to the advent of cracking, there was a wide difference in price between gasoline and fuel oil, a difference that declined rapidly to an amount approximately equal to the relative value of fuel oil as such or as gasoline. This relation has not held in 1927 because of the general demoralization of both markets. During the past year, the difference has been decidedly in favor of selling fuel oil as such rather than cracking it into gasoline.

IT IS impossible to go much further into the economics of fuel oil because of the lack of detailed statistics. In the past three years 16,456,000 barrels of gas oil and fuel oil have been added to the accumulations of the previous years (to Dec. 1, 1927) at refineries east of California. This is 50 per cent of the total stocks of all oils accumulated by refineries during these three years. During this same period, there was a draft of 1,923,000 barrels upon the stocks of gasoline previously accumulated.

It is impossible to make an accurate statistical analysis of the national situation. All classes of fuel oils are reported under one heading and, in addition, California non-refinable crudes are reported with the fuel oils of that region. Because of the extreme flexibility of modern transporta-

tion, particularly ocean transportation, the national situation should be considered, and it is unfortunate that more detailed statistics are not available. It would be particularly useful if all fuel oils close to the seaboard could be considered in one study but such statistics are not available except under a general heading which includes all classes of gas oils and fuel oils.

Of the volume of all fuel oils in storage east of the Rockies, about two-thirds is held in regions bordering on the seaboards. This proportion has been almost constant for the past two years.

IT IS evident that the sales of fuel oils must be accelerated until they can keep pace with the other petroleum products. An increase in gasoline and kerosene sales would accomplish the same result to some extent through the elimination of some of the fuel oil by cracking. The possibilities for appreciably increasing the sale of these products does not appear to hold out as much promise as does the field of possible increase of fuel oil sales. The recovery of former fuel-oil customers would furnish an outlet for a large volume now without a market.

Real sales effort will be necessary in order to sell fuel oil in competition with other fuels. More attention will have to be paid to external competition and less attention to intensive competition within the industry.

It may be necessary to resort to research for new uses for petroleum products in general and fuel oils or the heavier oils, in particular. The industry has been out of balance since its inception, through having one product which was considered as the principal product. Kerosene was the first "principal product." Later gasoline took its place. During the past year or more, the tide has swayed between gasoline and fuel oil. The industry will never reach stability until there is a balance of demand for all petroleum products. The industry should accelerate the approach of this balance by research into new uses.

Better balance could be obtained under present conditions by proper regulation of outputs and by proper merchandising. By "proper merchandising" is meant a proper relation between price and output in order to bring a close balance of the volume of sales of the various products. Proper merchandising also means a proper attitude toward the relation of the price of crude stored to cover contracts and the price of refined products sold under these contracts.

The industry is severely handicapped by a lack of more detailed fuel-oil statistics. The problem of marketing the current output of fuel oil and of reducing the present large stocks is a very serious one. The need of accurate and detailed statistics covering fuel oils is evident.

NON-CHATTER
OIL FOR FORDS

The manufacture and sale of Ford Non-Chatter Oil is *covered by a patent* (the Sorensen Patent). Do you know whether or not you are infringing this?

We can *protect* you against infringement, by showing you how to make the finest NON-CHATTER FORD OIL with full protection under the Sorensen Patent. Send for full information.

NATIONAL OIL PRODUCTS CO.
HARRISON, N. J., U.S.A.
CHICAGO BOSTON CHARLOTTE

WHEN YOU WANT QUALITY AND REASONABLE PRICES
Mixed Carload in Drums—or Tank Cars
"INVINCIBLE" MOTOR OILS
"CASTOR-OI" (BEAN CASTOR BLEND) MOTOR OIL
100% Pennsylvania or Western Blends
To Match Any Oil Made
A. D. MILLER SONS' CO.
Millers Oil Refining Works
PITTSBURGH, PENNA.
Oldest Pennsylvania Refiners

The Biggs Boiler Works Co. Akron Ohio
Bulk Storage and Station Tanks
FORTY years successful experience; plant fully equipped for fabricating plate up to 1½" thick. Your specifications and inquiries are invited.
Pressure Stills for Cracking Process - Fractionating Towers - Dephlegmating Towers, Bubble Towers - Heat Exchangers - Agitators - Steam Stills - Crude Stills - Condenser Boxes, Run Down Tanks - Blending Tanks - Hemispherical Tanks - Blow Cases - Acid Tanks, Compounding Kettles - Storage Tanks to 80,000 Barrels - Smoke Stacks and Breechings, etc.
THE BIGGS BOILER WORKS CO., Buchtel and Bank Sts., Akron, O.; 300 Madison Av., New York

Montana's Oil Industry for 1927

By Ralph Arnold*

Presented before Petroleum Division, A. I. M. E., New York, Feb. 20-23

SINCE 1915, when Elk Basin field was brought in, eight oil fields have been developed in Montana and the production has risen from 50,000 barrels in 1916 to 8,000,000 barrels in 1926. The production for 1927 was 5,121,600 barrels and the total up to the end of 1927 was 27,138,239 barrels.

The eight fields, with their year of discovery are: Elk Basin, Carbon Co. (1915); Devils Basin, Petroleum Co. (1919); Cat Creek, Petroleum Co. (1920); Soap Creek, Big Horn Co. (1921); Kevin-Sunburst, Toole Co. (1922); Lake Basin, Stillwater Co. (1924); Pondera, Pondera and Teton counties (1927); and Bannatyne, Pondera and Teton counties (1927).

About 170 wildcat wells have been drilled in the state, of which 8 were successful and 162 were gas or dry wells. Hence, only one out of 21, or 5 per cent of the wildcats have been successful. The average depth of the wells has been 1600 feet and the average cost $32,000 apiece.

Up to Jan. 1, 1927, a total of 1,376 wells have been drilled in the producing oil and gas fields of the state, of which 904, or 66 per cent, were successful oil wells; 82, or 6 per cent, were gas; and 390, or 28 per cent, were dry. The percentage of dry wells is excessive as compared to the wells in other states, due to the uncertainties of limestone reservoir rocks.

Value of Oil and Gas

The total production of oil to Jan. 1, 1927, has been 22,016,639 barrels and of gas 7,265,330,000 cubic feet. The average price at the well for the oil has been $1.47 per barrel and for gas about 4 cents per 1,000 cubic feet. The value at the point of consumption has been about 23 cents per 1,000 cubic feet. The total revenue derived from crude oil has been $32,277,119, and from gas $350,613, or a total income to the producer of $32,727,832. Each well drilled in the state has already (to Jan. 1, 1927) averaged a return of over $21,000.

The total number of domestic (Montana) oil and gas companies organized, since the first in 1885, has been 844, of which 702 are still alive and 142 dead. Oil and gas companies registered for operation within the state to Jan. 1, 1927, but with outside charters, are 143, of which 66 are alive and 77 dead. Outside the few distributing companies, which are included in these figures, the grand total of 997 companies which have operated in the state, with few exceptions, have never paid dividends and most have been total failures.

The total area of Montana is 146,131 square miles, and of this 34,397 square miles or 23.5 per cent, is underlain by rocks impossible of oil production; 12,427 square miles or 8.5 per cent, by rocks unfavorable for oil, and 99,307 square miles or 68 per cent, by rocks possibly oil bearing. These latter comprise the bulk of the eastern two-thirds of the state, or that portion east of the Rocky Mountains. With the exception of Texas and Colorado, Montana contains a greater area of possible oil bearing rocks than any other state in the Union. Of the possible oil bearing area the writer believes that only a very, very small percentage is potential commercially productive oil land. For in addition to the factors of source and reservoir, is that equally potent element, structure.

Developments in Prospective Fields in 1927

The most important activities of the year center around the Sweetgrass Arch in the northern west-central part of the state. The discovery of oil in the Bannatyne was the outstanding development because of its distance (50 miles) south of the Kevin-Sunburst producing area. Here a true oil sand in the Ellis (Jurassic) was encountered at about 1500 feet, yielding wells producing 30 to 60 barrels daily of 28 degrees Bé, crude oil, with but little gas.

Secondary testing has limited the area of probable production to three or four sections. Oil and a heavy gas pressure of 570 pounds per square inch was encountered at 2100 feet on the Pondera structure, 25 miles northwest of the Bannatyne. The Pondera oil is 28 degrees Bé, but no quantitative production tests have been made in the discovery well, and secondary drilling on the structure has not progressed far enough to indicate the probable extent of the field. These two strikes stimulated wildcatting in the general region, but so far only with negative results.

Tests are being conducted at Bynum, 12 miles southwest of Pondera, and at Healy Springs. Unsuccessful tests at Conrad, Butte and on the Marias River, have proved a low syncline on the structural axis of the Sweetgrass Arch in the region of the Marias River. Test wells in the immediate vicinity of the Sweetgrass Hills uncovered considerable gas, possibly 50,000,000 cubic feet daily, enough to warrant a pipe line to Great Falls. The laying of this line was started in the fall. Several test wells put down for oil were failures, excepting one, the Flat Coulee well, northeast of the hills near the Canadian boundary, which bids fair to be a producer in the Sunburst horizon.

The probable failure of the Kremlin well, west of Havre, which was drilled to over 3300 feet without result, except for gas, and the failure of the Claggett well in northwest Fergus county to find commercial oil in the Cat Creek sands have been a great disappointment to those who are advocating the possibilities of northeastern Montana. Additional gas wells have been brought in in the central part (Cabin Creek) of the Glendive-Baker anticline in eastern Montana. Encouraging results in the form of gas have been encountered in the test now going down on Hamilton Dome, near Big Timber, Sweetgrass county.

The favorable results obtained by deep wells in penetrating the black oil zone (Carboniferous) in Oregon Basin, Wyo., have stimulated interest in several structures in southern central Montana, where this horizon is at drilling depth.

Developments in Proved Fields in 1927

In the Kevin-Sunburst field three new pools were opened in 1927. The Flickertail pool in the eastern end of the field has yielded 25 wells so far, producing 25 to 300 barrels each, the production being quite consistent. The Calpet-Moe-Lorenson pool situated between the old Hogan and Shoshone-Corey pools, has yielded wells with initial productions up to 4000 barrels. This pool is being extended eastward.

The Wilcox pool is a southeastern extension of the main field and obtains its oil in the Ellis at the shallow depth of 1350 feet. Wells are drilled in from 8 to 10 days, costing $2500 to $4000, and yielding 500 to 5000 barrels daily, initial. Kevin-Sunburst production fell off during the year because only 392 wells were drilled, whereas 500 were contemplated. The yield averaged about 12,000 barrels daily throughout the year. In contrast to the general overproduction throughout the United States, the refinery requirements of the Kevin-Sunburst region greatly exceeded the average daily production.

Cat Creek showed a gradual decline, although with practically no new drilling it has maintained its production at nearly 3000 barrels daily. The wells highest on the structure are slumping off until they become dry of both oil and water; properties lower on the structure are said to produce more oil and less water.

There was no new activity in Montana's two black oil fields, Devils Basin and Soap Creek, there being no market for this grade of oil. Some additional drilling took place in the Big Lake field, near Billings, but with no increase in daily production. Depth to the producing zone (3900 feet) militates against activity here.

*Consulting geologist.

Mechanical Methods of Prospecting Most Effective on Gulf Coast

By Donald C. Barton*

Presented before Petroleum Division, A. I. M. E., New York, Feb. 20-23

Because of space limitations only a portion of Dr. Barton's paper is republished here.

* * *

THREE definitely, and possibly five, salt domes have been discovered by the torsion balance in the Gulf Coast salt dome district of southeast Texas and southwest Louisiana within the three years 1924-26 in contrast to the discovery of only five new domes by geology in the preceding fifteen years.

The first of the salt domes—the first oil structure—discovered in this country by geophysical instruments was the Nash salt dome, discovered in the early spring of 1924 by the Rycade Oil Corp. This had been considered a faintly suspicious prospect; it was rated by the writer as having about five chances out of one hundred of being a salt dome, but apparently rated not so favorably by the geological departments of some other companies. It was blocked by the Rycade Oil Corp. and the reconnaissance torsion balance survey indicated the presence of a salt dome with a probability of better than 99 chances out of 100. The first well, drilled just south of the interpreted center of the dome, demonstrated the presence of the dome. The second well, located on the center of the east edge of the dome, showed that the edge of the dome had been placed slightly too far out.

Our interpretation at that time was based on an empirical study of many of the known salt domes, and we had not yet made a study of the mathematical phases of interpretation and of the types of gradient profiles produced by masses of different shapes at varying depths. From our empirical studies we recognized that on any one dome the position of the maximum gradients and the rapid decrease of the gradients outward from the dome to zero seemed to be in a tolerably constant relation to the edge of the dome but that from dome to dome there was considerable variation in the relation; and in outlining the edge of the dome from the torsion balance results, we expected that the first well drilled on the edge of the dome would cause a revision of our interpretation of the position of the edge, a revision that should bring the outlined position of the edge of the dome into fair agreement with the actual for the whole of the rest of the dome.

A radial contraction of 500 to 600 ft. in the position of the edge of the dome, as outlined in the sketch, brings the predicted position of the edge into very fair agreement with its actual position, except on the south. If consideration is taken of the facts that the Gulf Coast salt domes range in diameter size from less than a quarter of a mile to over three miles, and that they may be circular to slightly elliptical in plan, the delimitation of the edge of the dome with an accuracy of better than 1000 ft. was a very great advance on all previous methods of delimiting a dome not indicated by a well defined mound. As the result of later experience, we would not attempt now to make an accurate interpretation of the position of the edge of the dome from so sketchy a survey as that original reconnaissance survey at Nash.

THE other four salt domes discovered by the torsion balance are the Clemens, Allen, Long Point, and Fannett domes. The Clemens dome was discovered at a locality where the presence of a dome was not suspected. The Allen dome, like the Nash dome, was at a locality where there were some very faint indications of the possible presence of a salt dome. Both domes were discovered by the Roxana Petroleum Corp. The first indication of the Long Point salt dome was picked up by a German torsion balance crew working for the Gulf Production Co. but the seismograph more commonly gets the credit for the discovery of the dome, because it was used actually to establish the presence of the dome definitely. There had been no suspicion of the presence of a dome at that place, although it is on the edge of a large block of leases around some surficial sulfur water seeps of a type most commonly not considered as an indication of a salt dome. The Fannett salt dome was discovered by a Roxana Petroleum Corp. torsion balance crew and a German seismograph crew working for the Gulf Production Co., almost at the same time. Which had actual priority in the discovery, the writer does not know, but as the Fannett salt dome happened to lie wholly within the block of Gulf Production Co. leases and wholly off the block of the Roxana Petroleum Corp. immediately to the south, the credit for the discovery of the dome usually is given to the former company and to the seismograph. The presence of either dome was not suspected until indication of the presence of a

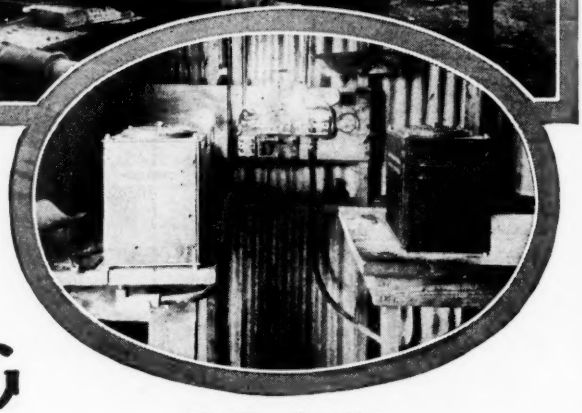
The Eotvos Torsion Balance Method

IN DISCUSSING the Eötvös torsion balance method of mapping geologic structure before the American Institute of Mining and Metallurgical Engineers at New York City, Feb. 20-23, Dr. Donald C. Barton, consulting geologist and geophysicist of Houston, discusses both the values and the limitations of instruments in attempting subsurface surveying.

No attempt is made here to reproduce that part of Dr. Barton's paper which deals with the purely scientific phases of torsion balance mechanism and operation. Excerpts from his paper that are reproduced deal almost exclusively with the results of using torsion balance instruments in exploratory work and something of what Dr. Barton believes may be expected of them in the future.

In using the torsion balance, science takes advantage of the long known principle that mountains or deposits of dense material will cause a plumb bob to be deflected from a vertical position. An iridium wire suitably enclosed and arranged to measure variation of intensity of gravity is, in short, what science knows as the balance instrument originated by Baron Eötvös of Germany, years ago.

*Consulting geologist, Houston.



The "Gastributor" or Intermitting Timer

NEW!

"JAT" INTERMITTING CONTROL SYSTEM

A Revolutionary Departure in Air and Gas Lift

Practical oil men scoffed at the idea that putting air or gas on wells *intermittently* instead of steadily would bring as great or greater total production at much reduced air cost. But the "Jat" Intermitting Control System has proved its contention in actual field operation,—has turned those who doubted into boosters.

The photograph shows two field men—H. A. Shaw and E. H. Short, Jr., Farm Boss and District Engineer for a leading company in the Seminole district, who, after carefully checking the operation of the "Jat System" on their lease, affirm that it "does everything that is claimed for it."

Under favorable conditions as many as 12 wells may be operated from one main pressure line. An electric timer operates automatic electromagnetic control valves situated on the branch lines to the wells, and thus puts the pressure on each well, in turn. Each well, while the artificial pressure is off, fills under its own pressure, and when the artificial pressure returns the oil is forced to the surface.

Proper use of the system takes full advantage of the well's own pressure, however light, and in no instance to date has production been reduced under this system. The system does bring (1) lower compressor costs, (2) lower operating pressures, (3) a saving in gas or air put into the wells, (4) control from a central distributing point, (5) saving in piping and equipment.

First introduced in California, now successfully operating in the Midcontinent, this revolutionary advance merits your immediate investigation. Demand for information is coming in from all quarters. Inquire of Westcott & Greis, sole distributors East of the Rockies.

WESTCOTT & GREIS, INC.,

Dallas **Tulsa** **Los Angeles**

WESTCOTT & GREIS

MEASUREMENT AND CONTROL

dome was given by the geophysical instruments.

According to reports, the validity of which the writer does not know, indications of the presence of the Moss Bluff salt dome are now known to have been given by torsion balance surveys made by two different companies in areas closely adjacent to the dome, although they were not recognized in the interpretation of the surveys.

The presence of a deep salt dome has been indicated by the torsion balance near Dewalt, southwest of the Blue Ridge salt dome, in Fort Bend Co., Texas. The presence of the dome is reported to have been checked by the seismic method, but the prospect has not been drilled as yet.

A small oil field has been developed at the Nash salt dome and a sulfur deposit has been found that is slightly too deep to be mined profitably at present. The Long Point salt dome has given evidence of being a first class sulfur dome and a half interest in the sulfur rights has been sold by the Gulf Production Co. at a price (it is reported) that would pay several times over the cost of all the torsion balance work that has been done in the Gulf Coast. Two oil wells have been completed at the Allen dome and a small amount of oil has been found on the Fannett dome.

SOME eight or ten torsion balance prospects in the Gulf Coast have been drilled and condemned. In no one of the cases known to the writer did the torsion balance indicate the presence of a dome with a probability of better than twenty chances out of one hundred. The Rycade Oil Corp. drilled three such prospects on the basis of torsion balance work done under the direction of the writer.

At each of the prospects, there was some indication that in itself almost warranted drilling—three shallow water wells with authentic shows of oil at one prospect, a sulphur-water well similar to those at Nash at another, and a water well with a water of abnormal composition for surficial waters at the other—and at each prospect the torsion balance mapped a gravity high that was fainter than and not just like the gravity highs associated with the known salt domes. It was hoped that the gravity high mapped was the obscure trace of a deeply buried dome, but each of the prospects was recognized as being on the border line of favorability and unfavorability.

A very distinct gravity minimum east of Welsh, La., mapped both by the Roxana Petroleum Corp. and by the Rycade Oil Corp. was considered by both companies as a prospect on the border line between favorability and unfavorability. It was drilled without finding any indication of anything abnormal, but the test may not have been well located.

The out and out failures of the torsion balance in the Gulf Coast area have been due, in the first place, to inexperience in interpretation; in the second place, to over-optimism in the use of indistinct indications; and in the third place, to the necessity of testing prospects of a lower order of favorability, in the absence of prospects of a high order of favorability.

Some fairly exact quantitative and semi-quantitative determinations have been made of the position and steepness of the flanks of the salt core and the cap and of the thickness and relative distribution of the cap. On account of its superior speed and its equal certainty of detection of a salt dome, above 2500 feet and its superior probability of detecting deeper salt domes, and its ability to work marsh, swamp, and shallow lake areas with considerable speed, the seismic method is the best for use in reconnaissance for new salt domes; but after a relatively new salt dome has been discovered, the torsion balance has been giving superior results in detailing the dome. From surveys very carefully made with the purpose in view, it is possible to contour the top, flanks, and thickness of the cap rock of some domes with a high degree of accuracy and of other domes with a fair degree of accuracy.

Texas Fault Line Mapped With Success

THE faults of the Somerset-Luling-Mexia-Powell-Sulphur River zone of faulting can be mapped with the torsion balance. Torsion balance profiles run under the writer's direction across the Sulphur River-Campbell fault, the Quinlan fault, the Powell, Richland, Currie, Wortham, Mexia, Luling fault-line oil fields, and faults southwest of Seguin in Guadalupe county and in southern Bexar county, indicated the presence and approximate position of the fault.

The faults of those zones have been mapped with the torsion balance by several other companies with varying degrees of success; whether the two or three failures have been failures of the method or of inexperienced interpreters, the writer is not sure. The faults in some places do not show up in the torsion balance results as clearly as in others, and many situations would be rather difficult for an inexperienced and poorly trained man to interpret correctly.

In the Panuco district of Mexico, the torsion balance is reported to have done some rather brilliant work in making well locations along faults.

The torsion balance does much more brilliant work in detailing a fault than on reconnaissance for faults. As a single fault represents in most places a rather simple mathematical situation, rather brilliant results may be obtained in quantitative calculations of the fault, but as the gravitational effects of faults commonly are limited to a very narrow zone, stations must be placed very close together to map the fault.

In reconnaissance, it is very easy to jump a fault, if any attempt is made to make speed in covering ground; and yet, taking stations every 500 feet along a traverse across the supposed fault zone or into unknown territory is a tedious, time-consuming, and expensive reconnaissance. Furthermore, often faults are compound rather than clean-cut single breaks, and may bend or be offset or cut by cross-faults. All such irregularities can be worked and determined by taking a sufficient number of stations, but they greatly hinder an attempt to get a hasty idea of the situation by reconnaissance.

The work of the torsion balance in the Mid-Continent district proper has been mostly reconnaissance to investigate the possibilities of the instrument and as yet very little drilling has been done on torsion balance structures. Although the torsion balance as yet has no Mid-Continent oil field to its credit as an outright discovery, the work with the torsion balance in that area shows that it has very great possibilities.

BURIED granite, gneiss, and Cambro-Ordovician ridges such as those in the Panhandle, as the Hambro-Nocona-Bulcher-Muenster ridge, Healdton, the Criner Hills, and some of the Kansas granite ridges, show up brilliantly in torsion balance surveys. In southern Oklahoma, a study of three long reconnaissance profiles showed:

(1) that the torsion balance results indicate seven first-class prospects and eleven second-class prospects;

(2) that if two wildcats were drilled on each structure on locations made wholly from interpretation of the torsion balance results, two first-class oil fields, one second-class oil field, and one or two fourth-class oil fields would be discovered, and the results on two of the prospects would not be known; the efficiency per well for the discovery of oil fields would be 30 per cent, with 30 per cent of the wells not heard from;

(3) that if two wells were drilled similarly on each of the second-class prospects, the results would be the discovery of three third-class oil fields, one small gas field, and one barren structure; one structure would prove to be false, and ten wells would be in areas where there has been no drilling; the efficiency per well for the discovery of oil fields would be 13 per cent with the result of 45 per cent of the wells not known.

Although in the Seminole district, the Seminole City is not very clearly indicated in a reconnaissance survey of the area, the Bowlegs field and the eastward-northward extension of the Earlsboro Wilcox pool were predicted from the torsion balance results, but in Sec. 2 T 7 S R 5 E, an A. P. C. well that is located on one of the better looking gravity highs of the area is apparently distinctly low. However, in the Seminole district, low wells are found rather anomalously in the middle of the structural highs and a single low well can not definitely condemn a surface or a gravity high. The Garber structure is faintly indicated by the torsion balance but on reconnaissance such a structure as Garber probably would not be detected unless the distance between the stations were 1500 feet or less.

The results of the very extensive torsion balance work in Mexico by several different oil companies are known only vaguely to the writer. The El Aguila Co. has been using torsion balances for four years in detailing the salt domes of the Isthmus of Tehuantepec. Several accounts have come through of exact verification by the drill of predictions made from torsion balance results in regard to the flanks of the salt core.

In the "Golden Lane," the torsion balance is said to have done some very interesting work, the details of which are not known. In the Panuco district, the torsion balance is said to have shown that a trend of production which unexplainably lay at an angle to the strike of the surface structure coincided with the crest of a buried ridge in the basement complex. A brilliant piece of work is reported in the location of faults in the Panuco district.

Method of Use of the Torsion Balance

A DISTINCT parallelism holds between the relation of the gravimetric surveys to geologic structure and the relation of structural geologic surveys to the occurrence of oil. As there is a tendency to a parallelism between the occurrence of oil and of certain types of structural situations, geologic structure may be used as an indirect method of finding oil. As there is similarly a tendency to a parallelism between geologic structure and the anomalous distribution of density, gravimetric surveys with the torsion balance may be used as an indirect method of mapping geologic structure.

As with oil geology, the torsion balance can handle certain types of situations brilliantly, does fairly good work in many others, and can do nothing at all in some cases. The torsion balance, like all the other geophysical instruments, is not a panacea for hunting geologic structure and can not replace geology, where good geologic work is possible; it should be used to supplement geology, in areas where only a small amount of structural work can be done, or to fill in the structure in areas where no structural work is possible. The success of the torsion balance in locating and defining oil structures will be just about the same as the success of geology in finding oil.

In the use of the torsion balance in oil work, four facts should be remembered:

(1) that what the torsion balance maps is differences in density;

(2) that the number of stations necessary to map a structure with a certain degree of accuracy is independent of the size of the structure;

(3) that surficial and topographic irregularities of which the effects can not be calculated limit torsion balance surveys; and

(4) that the interpretation of geologic structure from gravimetric surveys is just as complicated a subject as the interpretation of the probable occurrence of oil from a structural geologic survey.

The torsion balance may be used either for reconnaissance or detail mapping but in planning a program of work the possibilities and limitations of the method, as well as the importance of working some particular area, must be kept in mind. The method will give the most brilliant results where it is used in mapping structures that have produced considerable and sharp contrasts in density—for example, salt domes, granite ridges, faults in which massive limestone or anhydrite are faulted against sands and clays—and it will produce those results with a wider spacing of stations on large structures than on small.

Where prolific production is obtained from structures that do not produce much of a density contrast and that are not reflected in the surface geology, it may be well worth while to attempt to get some clue to the structure through torsion balance surveys, but the results will not be so brilliant or so reliable as the preceding cases; and it will require an extensive survey with a closely spaced set of stations and an analysis of results of a much higher grade of technique and experience in interpretation.

The present status of the torsion balance method for most oil companies is about the same as if the companies had to depend on young civil engineers for their geology. In a region of moderate relief where an easily identifiable limestone keybed can be walked out around the hillsides, a young civil engineer would be able to make an accurate plane-table map of the surface structure. If he had a hazy idea of the anticlinal theory of the occurrence of oil, he would be able to make a fairly good guess where to drill on well defined anticlines and domes, but his naive interpretation of more complicated structural situations would be badly in error.

Torsion balance observations are rather simple affairs. The visual types of instruments are simpler to operate than an explorer's alidade and, with the simple tabular computation forms, the calculations are reduced to a routine of elementary addition, subtraction, and multiplication. A bright young man without technical education can be trained to be an efficient torsion balance operator (for the Süss type of balance) more easily than he can be trained to be an efficient plane-table instrumentman. Such an observer normally will be able to bring an accurate map of the gradient and curvature of an area, but neither he nor a geologist who has not studied the interpretation of torsion balance results will be able to make an accurate interpretation of his results. They would be able to make a fairly good, approximate qualitative interpretation of the survey of some salt domes and some buried granite ridges. In a survey of the Healdton field, they would recognize the presence of some large, sharp structure but would interpret its form and position incorrectly. In surveys of Fox-Graham or of Garber, they would not recognize the presence of the structures.

The difficulty is that the indirect relation between geologic structure and the distribution of density is more intricate and complex than the indirect relation between geologic structure and the accumulation of oil. A torsion balance survey for practical purposes is an indirect method of mapping the distribution of density in the subsurface, and mapping the distribution of density in the subsurface is only an indirect method of mapping structure. Therefore the interpreter of the torsion balance surveys must know:

(1) the mathematical technique of interpreting bodies from the distributions they produce of gradient and curvature values;

(2) the relationship between geologic structure and the distribution of density; and

(3) the probabilities, possibilities, and impossibilities in the way of occurrence of geological conditions—and, not least, he should have a level-headed sense of the limitations and imperfections of the method.

To get the most out of torsion balance surveys, the interpreter should be a good mathematician and geologist, should have had a chance to study the mathematics of interpretation and should have had a broad practical experience with the method. There are very few men who have had sufficient opportunity to study the mathematics of the interpretation and who have had sufficiently broad experience to qualify as competent interpreters.

More barrels of cracked gasoline were produced by the Dubbs Process in 1927 than in any previous year

More in the last quarter of 1927 than in any other quarter

More in December than in any previous month

This is the record—in the face of general curtailment of refinery operations

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

Screened Radiant Heat, Its Application To the Oil Refining Industry

By A. E. Nash*

Presented at A. I. M. E. Meeting, Petroleum Division, New York, Feb. 20-23

THIS title is somewhat of a misnomer, because it does not accurately describe the phase of heat generation and application coming within the scope of this discussion. This paper is concerned primarily with that particular phase of radiant-heat transfer sometimes erroneously referred to as "shielded" radiant heat, to differentiate it from the open radiant heat of either flame or settings, in which the actual source of the radiant heat is a small incandescent furnace composed of a highly conductive superrefractory, within whose walls the combustion of the fuel is completed.

This small furnace is usually located directly in the furnace proper, and although its refractory walls do shield the heat-absorbing surfaces from contact with the gases of combustion, there is no interference with the radiant heat given off by the furnace itself. We do not believe it either necessary or advisable to shield or screen radiant heat when properly controlled and applied. We do believe it essential to prevent the excessively hot gases of combustion from coming in contact with those parts of the heat-absorbing structure that are already receiving heat at high rates by radiation.

In connection with any process for the refining of oil with which we are familiar, we are convinced that it is most advantageous to transfer the maximum of the heat generated in the form of radiant heat, applied directly to the heat-absorbing surfaces without the interposition of any form of shield or screen to prevent or reduce the radiant-heat transfer.

While the term radiant heat is broadly used to cover all heat energy transferred from one body to another by radiation, in contradistinction to heat given up by gases in direct contact with the heat-absorbing structure (convection) or transmitted simply by conduction, in furnace work it is perhaps more often limited to the heat rays given off either by the gases or the refractories used in the furnace construction, which are themselves at sufficiently high temperatures to show "color." Such energy rays approach the ultra-red rays, and in general act according to the laws which govern such light rays.

Former Objections to Radiant Heat

IT IS generally conceded that radiant-heat rays travel in straight lines, and that the intensity of the rays from any one point varies inversely as the square of the distance. It should be remembered, however, that in a furnace setting the radiant heat is confined within the walls of the furnace, and is reflected and reradiated from point to point, until ultimately taken up by the heat-absorbing structure, lost either by conduction through the ground and setting, or carried away by the combustion gases. This condition, therefore, tends to equalize the actual rate of transfer, and the relative distance between the primary source of heat and the heat-absorbing surface is of minor importance.

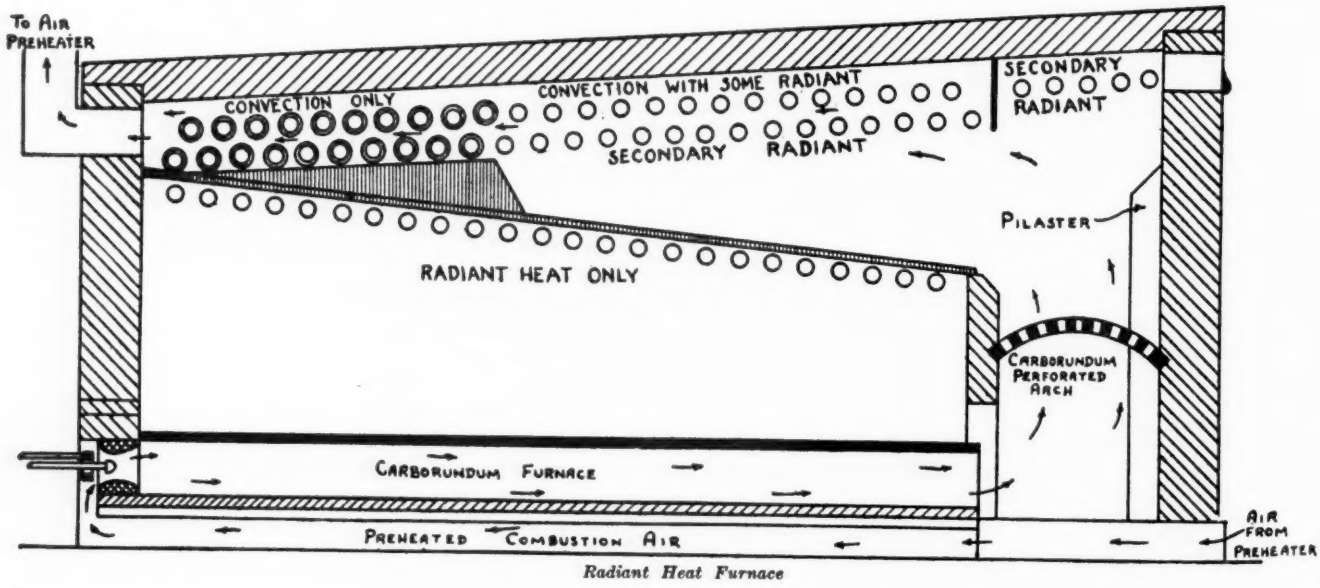
The rate of transfer then depends primarily on the temperature differential, and as expressed by the Stefan-Boltzman law,

$$H = 1600 \left\{ \left(\frac{T^1}{1000} \right)^4 - \left(\frac{T^2}{1000} \right)^4 \right\}$$

where H = the heat in B.t.u. per hour, and T^1 and T^2 the respective absolute temperatures in degrees Fahr. It should be noted that the rate of transfer, which varies with the fourth power, is very greatly affected by the relative temperatures, and extremely high transfer rates can be secured. Properly controlled, this is a most desirable condition, but where the furnace is not correctly designed, especially when the radiant heat is applied in addition to convection heat from the gases, difficulties may arise.

It is because of such conditions that only a few years ago radiant heat was regarded as something to be avoided wherever possible. Furnace builders designed their units to this end, and openly stated that "surfaces

*Alcorn Combustion Co.



Radiant Heat Furnace

for heating oil must not be exposed to heat directly radiated from the furnace."

At this time a limit of 1500 degrees Fahr. was commonly set and refinery engineers generally required that the temperature to which the oil was subjected should not exceed this figure. In arriving at this limit, pyrometer readings were taken at predetermined points, which, due to radiation loss, may or may not have been indicative of the actual temperatures in use.

EVEN more recently, men of the highest standing and of recognized authority have been opposed to radiant heat and have gone to extreme limits, even at the expense of low efficiencies and high costs, to avoid it. That there was reason for this attitude so general in the petroleum-refining industry is unquestioned, but it was due to the fact that in ordinary furnace construction, high gas temperatures result in incandescent settings, and the radiant heat from the extremely hot surfaces (frequently 2200 to 2400 degrees Fahr.) when applied in addition to the convection heat from such high temperature gases, gives a total heat input *in limited areas* which is more than either the metal or the oil will stand.

For example, with a temperature of 2400 degrees Fahr., assuming an oil temperature of 800 degrees Fahr., the combined rate of heat transfer by radiation and convection would approximate 110,000 B.t.u. per square foot of exposed surface. This would probably cause trouble and such conditions should be avoided.

Precautions to Prevent Radiant Heat

To this end, various ideas in construction and operation were tried with indifferent success. Dutch ovens were added to the furnaces with the idea of completing combustion in a zone which did not directly "see" the tubes or shell structure.

Bridge walls and arches were designed to prevent the direct action of radiant heat, while some refineries used entirely separate firing chambers, the heat-absorbing structure being located in a section supposedly separated from any direct radiant heat. These attempts, however, proved unsatisfactory, for when there was no means of absorbing the heat generated in the firing chambers, the temperature built up to a point where the refractories failed, and the temperatures carried over into the other section of the furnace, resulting in burned-out tubes or shells.

To avoid this condition and to keep the temperature within the required limits, excess air was purposely supplied and this air used to reduce the gas and wall temperatures. This naturally resulted in very low fuel efficiencies and high operating costs.

As long as the management of the refineries was satisfied with their daily capacity or throughput, and economy in fuel was not an essential factor in plant operation, it mattered little whether the heat necessary for any process was applied by convection, radiation or conduction; or a combination of any of these methods. When, however, the demand for finished products made it necessary and profitable to greatly increase throughputs, the tube-still largely displaced the shell-still, both for straight distillation and for cracking processes.

ECONOMY in operation also became a factor at the same time and every effort possible was made to reduce the amount of fuel consumed per barrel charged. The most obvious method of reducing fuel consumption was to reduce the amount of excess air. While this resulted in saving fuel, the increase in tube trouble and resulting loss in time on stream, more than offset the savings in fuel.

This was particularly true in the operation of such tube-stills and cracking coils as required high temperatures and which had a greater tendency to "coke up" the tubes. The heavier the charging stock, the more pronounced the difficulties. Observation indicated that as the refractories increased in radiance, the direct result of increased combustion temperatures, tube failure became more pronounced and therefore radiant heat was blamed.

To prevent the walls from becoming radiant, some furnace builders provided tubes, frequently covered with refractories, for the specific purpose of keeping the walls at a low temperature. However, with good combustion conditions the resulting temperatures still caused trouble and it was necessary to use large quantities of excess air. Such construction was frequently referred to as "shielded" radiant heat, although essentially this construction was a blocking or an attempt to eliminate the radiant heat.

Actually the tubes so covered received little or no heat directly as radiant heat, since the refractories were essentially impervious to the radiant rays. These tubes, therefore, were primarily dependent on the heat conducted through the tile covering, and since these tile were in most cases composed of fireclay, which is not a good conductor of heat, the transfer rate was low. To overcome this condition, some of the tile were removed at intervals until the desired rate of transfer was secured or until tube trouble resulted.

Certain engineers utilized the idea of tempering the gases by recirculating a portion of the waste gases, and forcing these gases back again into the furnace. This helped conditions and permitted better economies, at the same time increasing the heat transfer rate because of increased gas velocities. It necessitated, however, expensive blowers and ducts, greatly increased the first cost, and at the same time was a source of constant expense for both power and maintenance.

Conditions for Furnace Efficiency

THE importance of furnace efficiency has now become generally recognized and the following conditions are regarded as almost fundamental:

1. Sufficient air for complete combustion of the fuel but with little or no excess. A preheated combustion air further improves operat-

The Radiant Heat Furnace

THERE has been much interest among refiners in the carborundum furnace designed to protect still tubes and sheets from the oxidizing heat of the gases of combustion and effect the desired input into the oil by means of radiant heat. Some refiners have tried out the carborundum furnace. All will be interested in the accompanying paper. Mr. Nash sums up the advantages of the radiant furnace as follows:

1—Higher rates of heat input into the oil without danger either to furnace, tubes or oil.

2—More uniform heat input over the entire heat-absorbing surface since the variable of excessively high temperature gases is eliminated.

3—Correspondingly smaller and less expensive units for the same throughput.

4—Better fuel economies, since there is no necessity for large quantities of excess air.

5—Higher yields under comparative conditions with improved products, since uniform heating keeps the formation of coke and fixed gas at a minimum.

6—In the case of cracking coils and pipe heaters, a greater percentage of operating hours.

7—Safety. An even heat "bath" for that part of the equipment carrying oil at high temperatures and pressures with no possibility of excessive temperatures from secondary combustion.

ing conditions and reduces stack losses.

2. Thorough mixing of the fuel and air.

3. High furnace temperatures until the fuel is completely burned.

4. Sufficient furnace volume to insure the necessary time for the combustion to be completed before the gases come in contact with the heat-absorbing structure, since otherwise secondary combustion may result accompanied by excessive temperatures or incomplete combustion.

5. Proper arrangement of the heat-absorbing surface to insure uniform and efficient heat transfer.

In this connection the effect of high temperatures on the time required, and consequently on the necessary furnace volume, should be kept in mind, since the speed of the combustion reaction is very greatly increased by increasing the temperature at which combustion takes place.

Tubes Become Overloaded

ANY heater constructed to avoid the transfer of direct radiant heat must of necessity depend primarily on taking the heat from the gases by convection. This is best accomplished by making the gases wash the tubes at rather high velocities, therefore the tubes are usually grouped in high, narrow banks, the restricted cross-section causing the gases to travel at the desired rate. The first and second rows of tubes in such a bank are subjected to the highest temperature gases, and at the same time receive practically 90 per cent of any radiant heat that may be deflected from the walls. This condition compels these first few tubes to take up a very large proportion of the total heat input, and these are the tubes which in general give the most trouble. The remaining rows usually absorb heat at comparatively low rates.

Obviously, any attempt to increase the throughput of a unit by increasing the temperature of the gases would result in still greater over-loading of the tubes in the first few rows. If, however, the radiant-heat temperatures can be properly controlled, advantage can then be taken of the correspondingly higher transfer rates, and the necessity for high gas velocities is avoided.

Under these conditions, a very much greater number of tubes can be exposed to the heat radiated and a wide bank of only a few rows of tubes can be used. That this principle is correct is indicated by the present trend in boiler design where, particularly in central-station work, the necessity for operating at maximum ratings has resulted in furnace designs and operation in which every effort is made to bring the percentage of radiant heat to the maximum.

Highly preheated combustion air, carefully regulated, is used to secure high furnace temperatures and the gases are made to wash the furnace walls so that a maximum of their heat is transmitted to the tubes as radiant heat. This condition has been carried to a point where the refractories themselves are the limitation.

Probably the best example of a radiant-heat furnace would be one heated by electrical resistors, where there are no combustion gases to handle. This type of furnace is in common use in the laboratories and among the oil chemists where a close regulation of temperature and a uniform distribution and application of the heat is essential. This then would be the ultimate in furnace design and the ability to approximate these conditions should be the aim of the engineer.

At the same time the coil design should be so handled that each and every tube absorbs heat evenly and at as high a rate as circumstances permit. Not only do ineffective tubes greatly increase the first cost, but because of the added resistance, particularly where high oil pressures and velocities are in use, they very considerably increase the cost of pumping, both for power and for equipment. Because of this feature it is frequently poor economy to rely on additional tubes to reduce the exit-gas temperature, which can be done at less cost and more effectively by air heat exchangers, provided the increased gas temperatures do not cause difficulties.

Radiant-heat Furnace

COMPARATIVELY recently improvements in refractories have made possible furnace designs which permit of the combustion of the fuel at extremely high temperatures, and with little or no excess air. These refractories are extremely dense, have a high factor of conductivity (roughly 8 to 10 times that of ordinary fireclay), are not impaired by the gases of combustion, and will withstand the highest temperatures that can be secured in commercial operation. A refractory composed of practically pure silicon carbide grain, known as carborundum, answers these requirements.

By taking advantage of these valuable physical characteristics to produce and control radiant heat, a furnace can be designed (Fig. 1) which will have many of the desirable features of an electrically heated furnace without the excessive costs of installation and operation. To this end, both the fuel and the necessary air for combustion are introduced and burned within a tunnel or long chamber having carborundum walls and known as a carboradiant or carborundum furnace. In such a furnace all of the essentials for higher combustion efficiency previously noted are secured. The necessary air for combustion can be closely controlled and may be preheated to almost any desired temperature.

THE fuel (either gas, well atomized oil, or powdered coal) with the air for combustion, passes through the restricted cross-section formed by the carborundum walls at velocities of several thousand feet per minute, insuring complete mixing of the fuel and air. Since the combustion takes place completely within the carborundum walls, and preferably with an already preheated combustion air, extremely high temperatures are generated; which, however, are entirely screened from the heat-absorbing structure by the carborundum walls.

The gases, therefore, cannot become chilled and the combustion is carried out without any retarding action whatever. These ideal conditions result in much higher combustion rates, and experimental work indicates that a heat release many times in excess of common practice can be secured without difficulty.

The high internal furnace temperature results in the carborundum walls becoming incandescent, and in operation they assume a balance depending on the amount of heat being generated, and the heat being absorbed. Because of the high conductivity of the carborundum tile, the heat easily passes through the furnace walls, and in practice the outside surface usually assumes a temperature of from 1400 to 1600 degrees Fahr., thus providing a positive source of radiant heat. This temperature can be more or less controlled by varying the furnace proportions, and can be materially increased by using highly preheated combustion air and relatively smaller areas of heat-absorbing structure.

This provides a means of generating heat under almost theoretical combustion conditions which can be so controlled that almost any desired temperature can be maintained.

Since a maximum of the heat generated is disposed of as radiant heat, the heat left in the gases is materially reduced, resulting in lower gas temperatures, and the necessity for recirculation is eliminated. Moreover, with little or no excess air the gas volumes are smaller, and in consequence the stack losses are reduced to a minimum.

By the use of carborundum furnaces, therefore, the general furnace design can be greatly simplified and the cost materially reduced. The heat-absorbing surface may be divided into two sections, one of which is heated only by radiant heat so evenly distributed and so closely controlled that oils, even at high temperatures and pressures, can

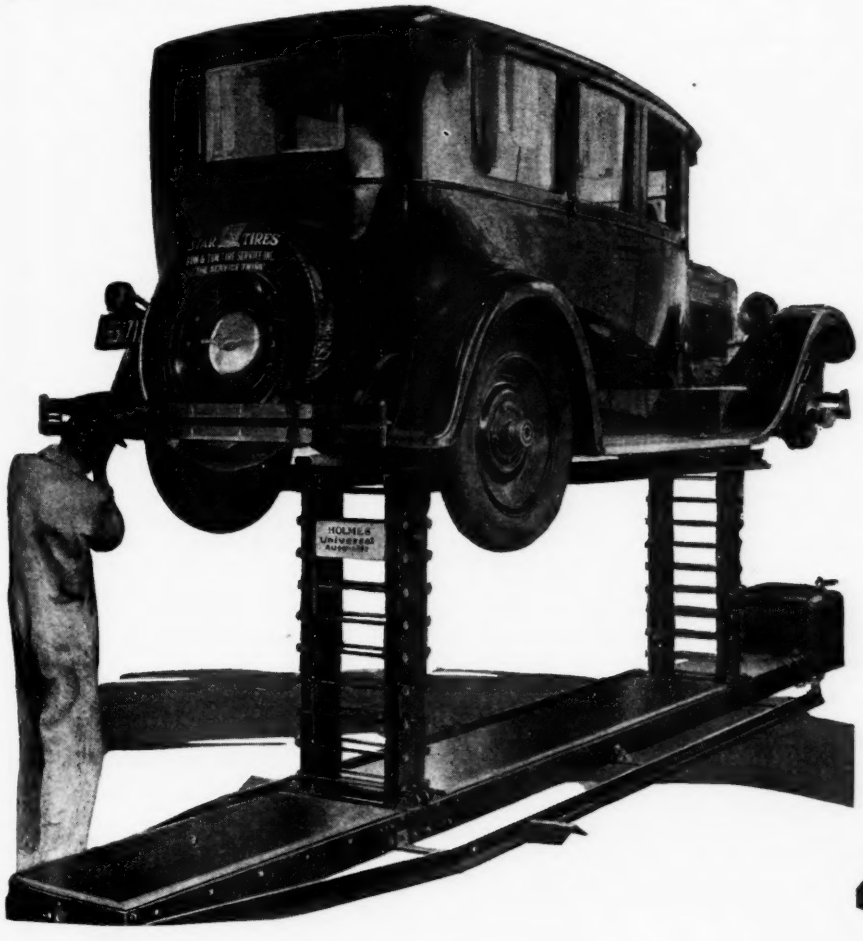
Quick Service--Big Profits

No Obstructions-No Installation Cost-!

Holmes Engineers have developed in Holmes Universal Auto Lift every possible convenience. When it becomes a part of your investment in modern equipment—when it begins working for you—advertising for you—attracting new customers, you are able to deliver exactly the type of service the motorist wants—clean, prompt, efficient and *safe*.

The Holmes is the only lift that can completely satisfy the demands of the up-to-date filling station. Every part of the car is instantly and completely accessible without obstructing posts, pits or lifting arms. Transmission, clutch, crankcase and rear axles can be drained or covers removed without the slightest interference. Wheels, wheel-assembly, steering gear, springs, spindle bolts—all the hard-to-get at places are instantly raised to the exact height for ideal working conditions. Washing, polishing, greasing, doping—every service problem is made easier and every car is on, up and away with a speed that makes customers happy and keeps your profits rolling in. All the time.

Investigate your opportunities for quicker service and bigger profits with this self-contained unit. A descriptive folder will be sent on request. Send for it today.



NO INSTALLATION COST

The Holmes Universal Auto-Lift is shipped in one complete unit with only the guide rails detached. No posts to erect, no pits to dig, no concrete work and no air or plumbing connections. Simply unload, attach the guide rails and connect the motor. It can be placed in operation or moved from one location to another in less than an hour's time.

NO OBSTRUCTIONS

Every obstruction has been eliminated. Cars are raised by front and rear axles, leaving wheels and wheel assembly entirely free. There are no posts, pits, cables or lifting arms to slow down the work of costly labor.

ELECTRICALLY OPERATED

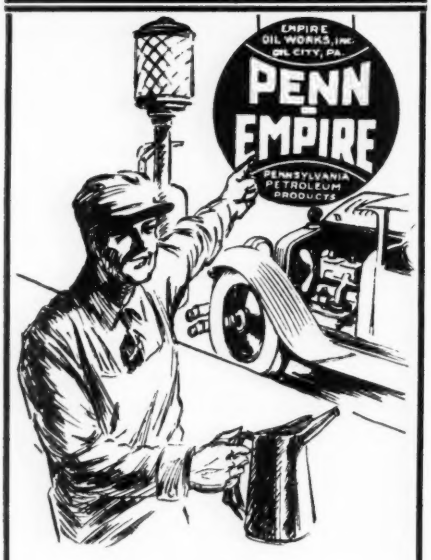
The Holmes Universal Auto-Lift is operated entirely by its own self-contained electric motor. There are no oil reservoirs, no packing glands and no water or air connections. The operation of the lift is not affected by weather conditions or by the failure of an over-loaded air compressor.

The Holmes occupies only a minimum of floor space. It may be operated either indoors or out, upstairs or down.

The Holmes is protected from weather and dirt by a metal covering. Easy to keep clean and attractive.

ERNEST HOLMES COMPANY

CHATTANOOGA TENNESSEE



"That sign means a lot to us . . . ."

"WITH a neighborhood business like ours, it's the oil that's the money maker of the station and we can give Penn-Empire Oil a good deal of the credit for the success of our business. That's why that sign means a lot to us.

"Once a man starts to use Penn-Empire oil, he is pretty certain to keep on using it because he finds that he can safely depend on it for at least 1,000 miles—and often 2,000 on a fill."

Jobbers:

Penn-Empire Motor Oils and Greases are dispensed to the public under our own brand name, in attractive packages, including the five gallon Ezi-pour drums, or under the individual local brand name, if preferred. But no matter what name it goes under, it's the same good 100% Pennsylvania Oil. Write for our proposition.

WHEN YOU BUY PENN-EMPIRE YOU GET THE BEST.

EMPIRE
Oil City
PENNA.
PENN EMPIRE
100% PURE PENNSYLVANIA OIL
OIL WORKS

be subjected to high heat input without danger to either the structure or to the oil.

The remaining tubes take their heat from the resulting waste gases which, having given up a considerable portion of their heat, are necessarily at lower temperatures. As combustion is entirely completed in the carborundum furnace, there is no danger from secondary combustion. A higher average rate of heat input can therefore be maintained and a lesser amount of heating surface or tubes is required.

The fact that a considerable portion of the setting is completely separated from contact with the combustion gases permits of the use of special insulating refractories, having relatively poor resistance to flame erosion but high insulating value. This construction insures a minimum of radiation losses with lower construction costs. The size of the units for the same capacities can be made less and the cost of construction further reduced.

The ability to control the heat distribution where radiant heat only is used is most advantageous in cracking and offers a simple means of providing a closely controlled soaking period. For example, it has been pretty well established that if three rows of tubes are used in the section heated only by radiant heat, the respective rows will take up heat in the proportion of 6-3-1. That is, if the row nearest the source of heat absorbs heat at the rate of 12,000 B.t.u. per square foot, the second or middle row will take up heat at the rate of about 6000 B.t.u., while the heat input in the upper or third row would only be about 2000 B.t.u. per square foot. This ratio is naturally somewhat dependent on the oil temperatures.

Advantages of Radiant Heat

TO SUM up, therefore, it is believed that, contrary to previously accepted ideas, radiant heat, when properly controlled, is a most desirable means of applying heat to petroleum products, since by its use the following advantages may be secured:

1. Higher rates of heat input into the oil without danger to either the structure or to the product.

2. More uniform heat input over the entire heat-absorbing surface, since the variable of excessively high temperature gases is eliminated.

3. Correspondingly smaller and less expensive units for the same throughput.

4. Better fuel economies, since there is no necessity for large quantities of excess air, and better combustion conditions result, with heat losses reduced to a minimum.

5. Higher yields under comparative conditions, with improved products, since uniform heating keeps the formation of coke and fixed gas at a minimum.

6. In the case of cracking coils and pipe heaters, a greater percentage of operating hours, as the lack of coke formation and absence of tube trouble reduces the necessity for shutdowns.

7. Safety. An even heat "bath" for that part of the equipment carrying oil at high temperatures and pressures, with no possibility of excessive temperatures from secondary combustion.

At this time units are in operation in which a heat input of better than 30,000 B.t.u. per square foot of tube area is secured at certain parts of the coil. Other parts of the same heater are absorbing heat at greatly reduced rates. If it can be demonstrated that tube structure and the oil being processed can withstand such rates of transfer commercially, then with the even heat distribution possible through the use of radiant heat only, a much higher average rate of heat input can readily be maintained. To secure this condition it is essential that the tubes shall receive the radiant heat rays directly, without the interposition of any shield or screen whatever, but rather with as many tubes as possible so placed as to receive the maximum of the radiant heat available.

A heating coil designed to insure such conditions, and operating at the higher temperatures now coming into use, might take the form shown on the attached drawing, although the principles involved permit of several modifications of the general arrangements. To illustrate what might be expected in the operation of such a unit, and to indicate the relative transfer rates which might be expected, we give the following estimated figures based on 28-foot lengths of exposed tube of 4 inch O. D.

Assuming a generation of 30,000,000 B.t.u. and an over-all efficiency of 80 per cent, which we are confident can be secured by passing the waste gases through an air heat exchanger and supplying a preheated combustion air, the heat input to the oil should approximate 24,000,000 B.t.u. This would be divided among the various sections of the tube bank roughly as follows:

24 radiant tubes, 672 sq. ft. @ 20,000 B.t.u. per sq. ft. average, 13,440,000 radiant only.
20 secondary rad. tubes, 560 sq. ft. @ 10,000 B.t.u. per sq. ft. average, 5,600,000 chiefly radiant.
14 combination tubes, 392 sq. ft. @ 5,000 B.t.u. per sq. ft. average, 1,960,000 chiefly convection.
20 convection tubes, 560 sq. ft. @ 5,000 B.t.u. per sq. ft. average, 2,800,000 convection only.
Total, 23,800,000.

This indicates a total of roughly 80 per cent of the heat input entering the oil as radiant heat, and such high average rates of transfer must of necessity be dependent on a most even heat distribution, which in our judgment can best be secured by controlled radiant heat.

Acid Sludge Disposal Remains Unsolved Problem to Refining Plants

By J. B. Rather*

Presented before the Petroleum Division, A. I. M. E., New York, Feb. 20-23

A Troublesome Pest

WHILE there is not much to cheer the refiner in the accompanying paper—Mr. Rather holds out little hope that the sludge disposal problem is likely to be solved to complete satisfaction—nevertheless it is exceedingly interesting inasmuch as the author reviews what has been done toward finding the answer to the riddle.

He discusses the early attempts to reclaim the acid and use up or otherwise get rid of the noxious sludge and traces developments in this art down to the very latest stages. Pointing out that one of the answers to the problem would be not to make the sludge, he holds, however, that notwithstanding development of some new methods of treating, sulfuric acid will still have to carry the hod as the treating agent in the oil business, and therefore the refiners will have to go on making sludge and trying to get rid of it.

SULFURIC acid was used as early as 1792 by Tower in refining "coal oil" in the British Isles, and by 1860 there were 53 refineries in the United States manufacturing "coal oil," most of them using sulfuric acid as a refining agent. Following the completion of the Drake well in 1859, many of the "coal oil" refiners began to use petroleum for manufacturing illuminating oil, and their methods and equipment were adapted so far as possible to this new raw material.

The value of sulfuric acid in refining "coal oil" having been established, this reagent was immediately tried and found to be satisfactory in refining petroleum. Notwithstanding the tremendous advances in petroleum technology since that time, sulfuric acid remains today the most valuable and most widely used means for refining petroleum products.

With the almost immediate expansion of the petroleum industry came the problem of disposing of the acid sludge produced in the refining operations. While in 1859, the year of the discovery of the Drake well, a patent was granted for sludge separation and separated acid concentration, most of the earlier refiners, and many of their successors, felt that separation and recovery of spent acid was uneconomical.

Accordingly, many of them disposed of the sludge in any way that seemed expedient at the time. It was buried in the refinery grounds, barged and dumped at sea, run into neighboring streams, or dumped into sewers. Some optimists carted it to open pits in the hope that it would either sink into the ground or evaporate.

Not so many years ago, the superintendent of an eastern refinery, who was using the open-pit method of disposal, lost a sludge cart, with horse attached, in such a pit. The horse was recovered almost immediately, but its availability for further use was reduced to zero by the loss of its hair.

Those of us who are familiar with subsurface conditions in the older refineries know that excavations for foundations for refinery structures are very likely to lead to the discovery of a long-forgotten sludge deposit.

At a western plant, where the amount of acid sludge was not large, for a time it was disposed of by dumping into city sewers. The success of this method was more apparent than real, for the city authorities, noticing unusual conditions, traced the difficulty to the refinery. Everyone was able to take cover except the refinery foreman, who had to explain his action in court, and later to meditate in jail for a short time.

ANOTHER simple method of disposing of acid sludge used by an eastern refinery some 30 years ago, consisted in the erection of a 500-barrel tank on a dock located on a navigable stream, with a draw-off pipe running through the dock into the water beneath. During the day the sludge was pumped into the tank and at night, just before leaving, the chief oil treater would open the valve leading to the water beneath the tank. The next morning the tank was empty and the cycle was begun all over again. This practice was followed for a number of years until it became evident that other means of disposal would have to be adopted. Even then it was felt that the ocean was the best place for sludge and it was barged out to sea and dumped.

Another refiner pumped his sludge to a sump located on a hillside. The level of sludge in the sump remained constant and the problem of disposal was regarded as solved. A few months later it was found, however, that much of the acid was finding its way to a lake in a neighboring valley, and another method of sludge disposal had to be found.

It is interesting to compare these early methods of sludge disposal, which were frequently based on an entire disregard for the rights of the community, with the modern practice, especially as regards water pollution, on the Atlantic seaboard. At one refinery, where all waste waters were discharged through a private sewer into a bay, samples of the water were taken direct from the sewer at 30-minute intervals for a period of several years. These samples were analyzed for acidity on the spot, and the acid concentration was kept, by dilution, to a very few parts per million.

At this refinery, and a number of others in the same section of the country, the waters adjacent to the plants in the same section of the plants are constantly patroled, and any oil or tar, whether resulting from sludge or otherwise, is skimmed off the surface of the water by hand. Elaborate and highly efficient trap systems have been developed and the precautions taken today to prevent pollution in a number of localities would be beyond the comprehension of the refiner of an earlier generation.

Development of the Separation Process

IT IS interesting to note that in the same year as the Drake discovery (1859), a patent (U. S. 24952) was granted to Henry Pemberton for a method of treating acid sludge. While this patent applied principally to sludge of bituminous origin, reference was also made to acid sludge

*Standard Oil Co. of New York.

from petroleum distillates. The proposed process consisted of:

1. A preliminary heating to obtain a separation of the free sour oil.

2. Agitation of the acid-sludge residue with hot water and open steam.

3. Separation of weak acid and tar.

4. The recovery of acid by evaporation of the weak acid in lead pans.

The patent is particularly significant inasmuch as the process formed the basis for a majority of the later patents. The Pemberton patent was followed by somewhat similar ones by Loftus in 1864, by Penissant in 1878 and by Farrar and Gill in the same year. These three patents form the foundation on which all modern practice of acid separation and recovery is based. Since that time many patents have been issued, a few of which are mentioned below, but practically all of them utilize the basic procedure of diluting with water, agitating and settling.

Various Methods of Recovery

Bower, in 1880, recovered sulfuric acid by washing the sludge with water in covered tanks and mechanically separating the acid solution from the carbonaceous matter and oily ingredients. Breinig, in 1884, mixed with the sludge a soap compound adapted to unite with the tar, and separated the free acid from the tarry mass. J. L. Gray, in 1909 claimed the production of pitch and asphalt from petroleum sludge by digestion with water, steam, or dilute acid recovered from the sludge, until the major portion of the acid had been recovered. The tar, comparatively free from acid, was heated with a steam spray until the mass was converted into pitch.

Another of Gray's patents covered a process in which the acid sludge was digested with water, air, and steam, until the light constituents rose to the top. These were drawn off, and the digestion continued until a second grade had arisen. A heavy residuum was drawn off from the bottom of the separator, and the weak acid finally separated.

Schildhaus and Condra, in 1910, heated acid sludge to 200 degrees to 300 degrees Cent. and at the same time introduced air into the retort at about the same temperature. The liquid hydrocarbons were distilled and condensed, and the gases, consisting largely of sulfur dioxide, were washed first with heavy hydrocarbon oil and finally with sulfuric acid. No better means of producing sulfur dioxide from the materials at hand could have been thought of.

VAN TIENEN, in 1911, appears to have been among the earlier inventors making use of both heat and pressure for sludge separation. He recovered hydrocarbons and sulfuric acid from sludge by mixing sufficient water with it to dilute to 52 degrees Be., and heating the mixture to a temperature of 140 degrees to 165 degrees Cent. at a pressure of about 100 pounds per square inch. The liquid was separated into two layers, one containing sulfuric acid and the other containing tar.

A type of separation for sludges from so-called "paraffine" lubricating oils, largely used in the past, and still the most desirable under certain conditions, consists in cooking the sludge, without dilution with water, with open steam in a cone-bottom, dome-top lead-lined agitator, equipped with a scrubbing device for taking care of the sulfur dioxide and other vapors evolved.

The cooking is carried on for several hours, after which the batch is allowed to settle into three layers, acid of about 45 degrees Be., pitch, and acid oil. The acid and acid-oil layers are drawn off and the pitch layer is fed to a screw conveyor, where it is subjected to a spray of cold salt or fresh water. This operation transforms the pitch into coke-like particles of about ½ to 1-inch diameter, which can be handled and burned under boilers or stills like coal.

This method has not proved altogether satisfactory, on account of the difficulty of transporting the acid coke or pitch and to the corrosive action on equipment when burning. The more recent installation of specially designed fireboxes and burning equipment has increased efficiencies in this connection.

An alternative practiced in some refineries consists in the neutralization of the acid coke with alkali after separation of the weak acid. The product in this case is liquid, pumpable and may be burned to advantage in the usual fuel-oil equipment. It is sometimes necessary, however, to add gas oil before burning, to lighten the consistency.

Forms of Separation

THE first form of separator was nothing more than a tank provided with means of agitation and suitable connections for withdrawing the acid and oil. This type of separator was adequate as long as gasoline and kerosene from paraffin-base crudes were the only products. The light character of sludges from these sources made the separation problem a simple one. It was soon found, however, that simple agitation with water would not serve to separate lubricating-oil sludges, and accordingly open steam pipes were introduced into the separators. With other types of sludges, notably those obtained from fuming acid treats of naphthene-base kerosene distillates, it became necessary to cook many hours with steam under a presure of several atmospheres.

All of these types of separators were intermittent, or "batch," separators. Continuous separators are a more recent development. Heckenbleikner, in 1926, patented a separator consisting of a "closed pressure container, having an exterior acid-proof lining and air interior refractory facing for the lining." Suitable lines and tanks necessary for accomplishing the continuous separation of the acid sludge and its constituents are provided. An eastern refiner uses a simple device for separating in a continuous manner the sludges obtained from 66 degrees acid treatment of gasoline and kerosene distillates. This separator operates without external heat and without pressure. It delivers a separated acid of constant gravity and requires practically no attention.

Separators may be of almost any size, from 50 to 500 barrels capacity, depending on the amount and nature of the sludge available and on whether or not the separated sludge is to be fluxed in the separator. A typical batch separator for light-oil sludge consists of a lead-lined, cone-bottom and cone or dome-roofed tank, equipped with water and air lines and sludge intake and draw-off connections. Frequently it has means of scrubbing the air as it goes out of the separator, in order to remove the sulfur dioxide which is invariably evolved in considerable quantities.

Separators for certain types of Pacific coast light-oil sludges are practically autoclaves capable of withstanding a pressure of 100 pounds per square inch, or more, in which the sludge is cooked with water and steam for several hours.

Where light-oil and lubricating-oil sludges are available in the same plant, they are frequently combined before the acid-separation process, and the resulting mixture of pitch and acid oil is fluxed with heavy fuel oil. In general, separators for this purpose are of conventional design, as described above.

Development of Acid Concentrators

MANY of the earlier refineries had sludge-acid separation plants but were not equipped for acid concentration. The separated acid was sold to other refiners equipped to concentrate acid, or to manufacturers of acid phosphate intended for fertilizer, or disposed of by dilution with sea water, where that was available.

Concentration methods were given attention by inventors at an early date. Both Loftus, in 1864, and Penissant, in 1878, described methods

for concentrating separated acid. Gronsilliers, in 1888, added sodium sulfate to the separated acid and the bisulfate was precipitated by boiling and evaporating. The precipitate was dried and the acid recovered by heating at a moderate red heat. Waring and Breckenridge mixed about 4 per cent of sodium nitrate with sludge acid at a temperature between 60 degrees and 180 degrees Fahr., to purify it and permit the recovery of the sulfuric acid. A foreign patent of interest is that of the Steaua Romana Petroleum G. m b. H., in which the separated black acid was allowed to flow continuously into pure boiling concentrated sulfuric acid in the presence of an oxidizing current of air, the evolved acid vapors then being condensed and reconcentrated in standard apparatus.

The common American practice in sludge-acid concentration up to about 1920 consisted in concentrating to 60 degrees Be. in lead pans, and finishing to 66 degrees Be. in cast-iron pans or glass retorts. The lead concentrating pans commonly employed varied considerably in size in the different plants. According to Day, units 5 feet wide by 50 feet long and 10 inches deep, as well as a series of shorter pans of the same width (15 to 20 feet long) were not uncommon. Such pans were generally constructed of 10-pound chemical lead, and supported by perforated cast-iron plates laid over the furnace flues. Heat for concentration was frequently supplied by combustion of the separated acid oil.

The acid left the last compartment of the pan, or the last pan of the series at about 60 degrees to 62 degrees Be., and passed to a series of two cast-iron pans, or "stills," generally about 4 by 8 feet by 10 inches deep, provided with hoods lined with acid-resisting material, leaving the end pan at a temperature of about 450 degrees Fahr. and a gravity of about 66 degrees Be. The vapors were usually condensed in a scrubber and the weak acid returned to the system. The life of these castings was very short, averaging in one western plant about six weeks, and failure of the pans frequently resulted in the loss of appreciable percentages of acid.

Increased efficiency in operating pan plants was said to be obtainable by bubbling air through the acid, and by cascade systems of fused silica basins. However, while a "pan and still" plant was built on the west coast as late as 1920, and while many such plants are no doubt still in use, the trend in the last seven years has been away from such methods of concentration.

In a number of refineries, particularly in the east, the final concentration of the acid was conducted in glass retorts or "bottles," holding about 750 pounds of 62-degree Be. acid. This type of installation also delivered acid of 66-degree Be. strength. When the bottles were carefully set and properly handled, the loss in breakage in a bottle plant was said to be small. However, the operation was intermittent or "batch," instead of being continuous, as was the case with the pan or "still" system, and the fuel cost was high. Furthermore, this method of final concentration was decidedly dangerous. There was no way adequately to test a "bottle" before it was put into service, and the failure of a bottle frequently resulted in dumping 700 pounds or more of concentrated acid at a high temperature on the floor of the bottle house. Refinery superintendents and foremen showed an entirely justifiable lack of interest in what was going on in the bottle house, and their inspections of operations frequently consisted in going in at one door of the house and out the other as rapidly as possible.

Systems of Concentration

THE first plant on a semi-commercial scale for the continuous concentration of acid by bubbling hot flue gases through it was erected at Brooklyn in 1919, and the first fully commercial plant of this type was erected at Buffalo, N. Y., during the next year. This was followed by an installation at Providence, R. I., a short time later. Many such plants are scattered through the United States today.

This type of sludge-acid concentration is known as the Chemico process, and is based on the fact that when a mixture of hot air and flue gases is passed through the liquid to be concentrated a substantially lower temperature may be carried than is required for pan concentration. In addition, heat transfer is better, and fuel costs correspondingly reduced. The total operating costs, including fuel, labor, general expenses and repairs, losses and royalty, is said to be fully 50 per cent lower than with the pan and still system.

Another system of sludge-acid concentration, known as the Simonson-Mantius process, is based on the principle of vacuum distillation, with its well known advantages. The first plant of this type was erected at Paulsboro, N. J., several years ago, and a number of other plants of this kind have been put into operation since that time.

A more recent development is the Geyser system. This process resembles the Chemico process in that hot flue gases are used to supply the heat needed for evaporation of the water, but differs from it in that the evaporation is accomplished by blowing the flue gases across the surface of the liquid, which is kept in a violent state of ebullition by means of an independent stream of air.

The Chemico and Vacuum processes are two-stage systems, in which the first concentration is to 60-degree to 62-degree Be., and the final concentration to 66-degree Be. The Geyser system is a one-stage process.

While great progress has undoubtedly been made in reducing the cost and nuisance of sludge-acid concentration, the nature of the material to be handled is such that this part of refinery operation still remains a troublesome and expensive procedure.

Disposal of Sludge by Burning

The solution of the sludge-disposal problem by burning the sludge has probably been attempted at one time or another by almost every refinery superintendent. Burning the sludge direct, without separation or fluxing, has been practiced to a certain extent. Burning after fluxing, without separation of acid, has also been tried. Burning after separation, either with or without fluxing, and burning the "coked" separated sludge, have been practiced for a long time.

At a large refinery on the Pacific coast it was formerly the practice to burn lubricating-oil sludges under boilers without any preparation whatever except separation of the loose acid. In order to facilitate combustion, the boiler furnaces were fitted with Dutch ovens, which reduced to a very considerable extent the tendency to throw unburned agglomerations of soft carbon out through the stacks. Of course, in such a system all of the sulfuric acid in the sludge went out the stacks as acid or as sulfur dioxide and possible trioxide, and it would not be possible to practice such a method of sludge disposal except in localities where the neighbors were few.

At one plant in the Mid-Continent field, partly neutralized sludge is mixed with about 20-degree A. P. I. fuel oil and burned in a specially designed burner with a vibrating valve stem. This type of sludge burning has been tried elsewhere and with varying success, depending on the nature of the sludge at hand.

The operation and maintenance of such systems as the above are both troublesome and expensive. Acid-resisting lines and pumps have to be provided, and even when the sludge is kept circulating all the time, line plugging is frequent.

Burning separated sludges from gasoline and kerosene treats from stock of Mid-Continent origin is relatively a simple matter. Such sludges are generally fluid enough to burn without fluxing, although there is frequently a certain amount of

pitchlike material which cannot be pumped conveniently.

At one time, in an eastern refinery, sludges from the treatment of crude oil intended for cylinder stock were fluxed after the separation of the acid. Fluxing was done with heavy Mexican fuel oil with the aid of open steam in separators of about 500-barrel capacity. The fluxed sludge was then pumped about 1000 feet to a boiler house and burned. This system worked in a satisfactory manner as long as the sludge was separated and fluxed within 24 hours after it was produced. If allowed to "ripen" for several days before separation was attempted, it was almost impossible to secure adequate separation of acid or a satisfactory fluxed fuel.

The method of coking lubricating-oil sludges has been described above under methods of sludge separation. For types of sludge that respond to this treatment, this is probably the best way to handle the problem. This is largely due to the fact that sludges that may be coked readily are very difficult to flux, and vice versa.

The proper method of disposal of sludges is very largely dependent on local conditions and each refiner has a different problem to solve. We do not have, and probably never will have, a single method of sludge disposal that is applicable to all conditions.

The Fume Nuisance

Very early in the history of the petroleum industry, petroleum refineries were confronted with the fume-nuisance problem, and about 1858 Col. C. A. Ferris, of New York, was "forced to move his plant because his neighbors objected to the strange and unsavory odors caused by the distillation and refining of oils." At the present time the disposal of sulfur dioxide and other fumes resulting from the separation and concentration of sludge acid is a problem of some magnitude. As early as 1880, E. Clark obtained a patent for a procedure for recovering spent acid from acid sludge, in which the offensive vapors were conducted off by an exhaust produced by an induced steam blast while the sludge was agitated with steam.

Fumes, particularly sulfur dioxide, may be evolved at a number of points in treating, separating and concentrating. Batch treatment of lubricating oils is a prolific source of sulfur dioxide, especially when that gas has to be blown out of the oil by air prior to contact clay application. Closed continuous-treating systems for lighter oils are, of course, free from this nuisance. Sludge separators of the batch type are also large producers of sulfur dioxide, especially when the sludge has had a chance to "ripen" before separation. The volume of sulfur dioxide evolved from sludge from 66-degree acid treatment of gasoline and kerosene distillates was found in one case to be eight times the volume of the sludge when the latter had been allowed to stand only 24 hours before separating. Batch lubricating-oil sludge separators, where steam has to be used to effect separation, also add to the quantity of sulfur dioxide produced. Sulfur dioxide also inevitably accompanies any attempt to burn acid sludge direct, or after fluxing, or to burn fluxed or unfluxed residues of separated sludge or solid sludge.

The most prolific source of sulfur dioxide, however, is the acid-concentration plant. The old pan-and-still systems were notorious in this respect. In the Chemico type of concentrator, in the earlier installations, the fumes were scrubbed in packed towers with water. The more recent installations, however, use the Cottrell electrical precipitator. This type of scrubber has the advantage of higher exit temperature for the gases, but any sulfur dioxide not present in solution in water will still pass out to the air. Nevertheless, the Cottrell precipitator reduces the visible fumes enormously. The fumes resulting from the concentration of acid by the Simonson-Mantius vacuum process are taken care of by the water jet condenser which furnishes the vacuum for concentration. This is theoretically advantageous, for the reason that the sulfur dioxide is not mixed with a large volume of inert gases before scrubbing is attempted.

The fume nuisance in batch treating of lubricating oil has been eliminated at some points by putting an exhauster on the agitators and leading the fumes to a high boiler stack. Fumes resulting from batch separators may be minimized to some extent by means of steam or water jet condensers, and the amout of sulfur dioxide produced can be reduced materially by separating the sludge as soon as produced.

In the disposal of sludges and sludge residues by burning under boilers and stills, distribution of the operation evenly throughout the day is desirable, in order to reduce the concentration of sulfur dioxide in the air at any one time as much as possible. At one point where "acid coke" was being burned under stills with coal, it was necessary to limit the percentage of this material to 20, or below, in order to reduce air pollution to a satisfactory point.

It should always be borne in mind that the higher the stack and the higher the stack-exit temperature, the less chance there is for trouble from these sources. It should also be remembered that it is not the amount but the concentration of sulfur dioxide in the air which leads to complaints from neighbors.

Such complaints are of two kinds. The neighbors may object to the odor of the gas, or gases, and they may claim damage to vegetation. Only a very few parts of sulfur dioxide per million parts of air are required to damage vegetation, and a number of refiners maintain a vigilant patrol of the air of the neighborhood in order to reduce complaints of this sort to a minimum.

Substitutes For Sulfuric Acid

One way to handle the refinery acid-sludge problem is not to make the sludge. A number of substitutes for sulfuric acid have been suggested from time to time, but the majority of these are only auxiliary aids to sulfuric acid in refining petroleum products. Among these may be mentioned materials that depend upon certain absorptive properties for their usefulness in refining operations. Clay, bone char, activated carbon and silica gel are representatives of this class. These materials can either be used in relatively coarse particles in percolation filters or in a finely divided state by the so-called contact method.

Another class of materials suggested as substitutes for sulfuric acid are certain solvents, such as liquid sulfur dioxide, analine and methanol in admixture with certain aromatic hydrocarbons. These materials owe their refining value to their selective solvent action on certain constituents of the oil which are undesirable in the finished product.

The Edeleanu process, which involves the extraction of the aromatic hydrocarbons by the use of liquid sulfur dioxide, is the only one of these that deserves more than passing mention. This process was particularly designed for the production of good burning oils from certain Rumanian crudes, but it is applicable to other products, especially those requiring fuming sulfuric acid for adequate treatment. The Edeleanu process is in use on a commercial scale at a number of points in the United States, particularly on the Pacific coast and it is probable that it will fill a definite need in American petroleum technology.

Another type of refining process applied commercially in recent years is the Gray vapor-phase clay process. This has been applied commercially both at Mid-Continent and eastern refineries, principally on cracked gasolines.

Except under very limited conditions, none of the above processes, with the possible exception of the Gray process, make it possible to dispense with the use of sulfuric acid completely. Sulfuric acid still has to do the heavy work in refining, and the sludge-disposal problem is like the poor, it is always with us.

Personnel of A. P. I. Technical Committees is Named

CLEVELAND, Feb. 16

APPOINTMENT of a general committee on corrosion, a general committee on refinery technology and a committee on fundamental research to co-operate with the central petroleum committee of the National Research Council in the selection of projects to be financed by Institute research funds and to advise and assist in the prosecution of the research work, has been announced by the New York headquarters of the American Petroleum Institute.

Appointment of these committees was recommended to the directors at the annual meeting of the Institute in Chicago last December and was approved by directors. The general committee on corrosion is expected to promote co-operative activity in fighting corrosion in the industry and to make and supervise the execution of a program to that end.

The duties of the committee on refinery technology are defined as follows:

"1—To aid in providing a forum on refinery technology at the meetings and under the auspices of the American Petroleum Institute, in conformity with the action of the Board of Directors on the recommendation of the Committee on Technical Relationships, (See Bulletin No. 58);

"2—To advise the executive officers and technologist of the Institute with regard to all problems on refinery technology which the Institute is called upon to consider or act upon. The purpose of this is to provide machinery, which has hitherto been lacking except in the case of the committee on testing methods and specifications, for proper consideration of and recommendation in relation to such problems."

The membership of the general committee on corrosion is as follows:

Chairman: R. P. Anderson, American Petroleum Institute.

Vice-Chairman: F. N. Speller, National Tube Co.

Secretary: D. V. Stroop, American Petroleum Institute.

P. R. Applegate, Northern Pipe Line Group, 26, Broadway, New York.

E. P. Bly, Standard Oil Co. of California, San Francisco.

E. S. Dixon, The Texas Co., Houston, Tex.

Stanley Gill, Gulf Production Co., Houston, Tex.

A. E. Harnsberger, Pure Oil Co., 35 E. Wacker Drive, Chicago.

W. P. Haseman, Marland Refining Co., Ponca City, Okla.

W. G. Heltzel, Sinclair Oil & Gas Co., Tulsa.

H. F. Perkins, Gulf Refining Co., Port Arthur, Tex.

Ralph J. Reed, Union Oil Co. of California, Los Angeles.

Walter Samans, Atlantic Refining Co., 3144 Passyunk Ave., Philadelphia.

L. A. Turnbull, Sun Oil Co., Marcus Hook, Pa.

J. C. Walker, The Empire Companies, Bartlesville, Okla.

C. R. Weidner, Prairie Pipe Line Co., Independence, Kans.

H. W. Young, Midwest Refining Co., Denver, Colo.

The membership of the committee on refinery technology follows:

Chairman: E. W. Isom, Sinclair Refining Co.

Vice Chairman: N. E. Loomis, Standard Oil Co. of New Jersey.

Secretary: R. P. Anderson, American Petroleum Institute.

E. W. Isom, Sinclair Refining Co., 45 Nassau St., N. Y.

N. E. Loomis, Standard Oil Co. of New Jersey, Elizabeth, N. J.

D. T. Brandt, Henry L. Doherty Co., 60 Wall St., N. Y.

C. B. Buerger, Gulf Refining Co., Pittsburgh, Pa.

H. W. Camp, Empire Refineries, Inc., Okmulgee, Okla.

S. P. Coleman, Humble Oil & Refining Co., Houston, Texas.

O. P. Cottrell, Associated Oil Co., Associated, Calif.

T. G. Delbridge, The Atlantic Refining Co., Philadelphia.

S. H. Diggs, Mid-West Refining Co., Casper, Wyo.

R. A. Halloran, Standard Oil Co. of California, San Francisco.

E. T. Hanlon, Chestnut & Smith Corp., Tulsa.

Frank Holsten, Barnsdall Refining Co., Tulsa.

E. R. Lederer, Texas-Pacific Coal & Oil Co., Ft. Worth, Tex.

K. G. Mackenzie, The Texas Co., 17 Battery Place, N. Y.

W. D. Mason, Sun Oil Co., Philadelphia.

R. R. Matthews, Roxana Petroleum Corp., St. Louis.

Walter Miller, Marland Refining Co., Ponca City, Okla.

G. G. Oberfell, Phillips Petroleum Co., Tulsa.

R. C. Osterstrom, Pure Oil Co., Chicago.

L. W. Parsons, Tide Water Oil Co., East 22nd St., Bayonne, N. J.

D. Pyzel, Shell Co. of California, San Francisco.

F. A. Pielsticker, Skelly Oil Co., Eldorado, Kan.

J. B. Rather, Standard Oil Co. of N. Y., Brooklyn, N. Y.

W. F. Sims, Panhandle Refining Co., Wichita Falls, Tex.

W. L. Stewart, Jr., Union Oil Co. of California, Los Angeles.

L. B. Van Leuven, Vacuum Oil Co., 61 Broadway, N. Y.

R. E. Wilson, Standard Oil Co. (Indiana), Whiting, Ind.

W. S. Zehrung, The Pennzoil Co., Oil City, Pa.

The committee on fundamental research is made up as follows:

Chairman: Dr. R. P. Anderson.

C. B. Buerger, Gulf Refining Co., Pittsburgh.

W. F. Faragher, Universal Oil Products Co., Riverside, Ill.

R. A. Halloran, Standard Oil Co. of California, San Francisco.

J. B. Hill, The Atlantic Refining Co., Philadelphia.

E. W. Isom, Sinclair Refining Co., 45 Nassau St., N. Y.

C. O. Johns, Standard Oil Development Co., Elizabeth, N. J.

K. G. Mackenzie, The Texas Co., 17 Battery Place, N. Y.

R. C. McCollom, 452-3 Roosevelt Bldg., Los Angeles.

A. W. McCoy, Marland Oil Co. of Colorado, Denver, Colo.

R. C. Osterstrom, The Pure Oil Co., Chicago.

L. W. Parsons, Tide Water Oil Co., Bayonne, N. J.

A. E. Pew, Jr., Sun Oil Co., Philadelphia.

W. A. Raine, Union Oil Co. of California, Los Angeles.

J. B. Rather, Standard Oil Co. of N. Y., Brooklyn, N. Y.

C. W. Washburne, 27 William St., New York.

R. B. Whitehead, The Atlantic Refining Co., Dallas, Tex.

R. E. Wilson, Standard Oil Co. (Indiana), Whiting, Ind.

Guaranteed 100% PURE PENNSYLVANIA OIL

Finest Grades of

100% Pure Pennsylvania Products

GASOLINE
KEROSENE
FUEL OIL
NEUTRALS
BRIGHT STOCKS
MOTOR OILS

Our 30 years of experience is our guarantee to you of the finest and best products that can be produced.

Let us quote on your requirements.

Write—Wire—Phone

Superior Oil Works
Warren, Penna.

Save Your Copies of National Petroleum News

YOU can get a binder specially made to hold 26 issues—made of imitation leather and inexpensive.

It enables you to keep the weekly issues in good order and easily accessible.

Send check or money order for $2 and your N.P.N. binder will go to you promptly.

NATIONAL PETROLEUM NEWS
Room 701, 1213 W. 3rd St.
Cleveland, Ohio

Name .....

Address .....

Visiting Around the Refineries

By Paul Truesdell

National Petroleum News

Some Camera Eye Recognition

I WAS riding on a train into New Orleans the other day from a visit to the plant of the New Orleans Refining Co., 30 miles up the river at Norco, when shortly after leaving Destrehan, I was attracted by the back of the head of a man sitting half a dozen seats ahead of me. All I could see was the back of his head. I felt sure it was someone I knew.

It proved to be Malcolm H. Tuttle whom I hadn't seen for more than two years. I last talked to him in Denver when he was assistant to A. T. David, manager of refineries of the Continental Oil Co. Before that Tuttle was with the Producers & Refiners Corp. at Parco and Tulsa, and before that with the Mid-Continent Petroleum Corp. then Cosden & Co.

Mr. Tuttle is now chief engineer of the Mexican Petroleum Corp., a subsidiary of the Pan American Petroleum & Transport Co., control of which is owned by the Standard Oil Co. of Indiana. His headquarters are at the Destrehan refinery. The refinery is now running about 5000 barrels a day. The refineries of the Mex Pet and the New Orleans Refining Co. are only a couple of miles apart.

Coke Moving to Foreign Countries

SOME European countries are offering an outlet for some of the coke produced in American refineries. There is quite a lot of it moving by shipload from the Houston area. Only the coke made by running down at atmospheric pressure, "coke still coke" seems to answer the purpose which is the manufacture of brushes for electric equipment, electrodes and so on.

It is said that coke produced by cracking is not suitable for this use.

More Vapor Phase Plants Being Built

A UNIT of the Gyro vapor phase cracking process designed to handle 2000 barrels a day of charging stock is under construction at the Smiths Bluff, Texas, plant of the Pure Oil Co., according to Vice-President C. B. Watson. The original commercial Gyro unit was built by the Pure at its Cabin Creek, W. Va., refinery. This was described on page 20 of the Nov. 16 issue of NATIONAL PETROLEUM NEWS.

According to the February issue of Pure Oil News, plans are going forward for the construction of a number of Gyro plants in the near future.

Foreign Soil in an American Refinery

PEOPLES of Europe and other parts of the world have been coming to this country for many years but it is not often that parts of the European and other continents themselves come here and take root. This has happened, though, at the plant of The Texas Co. at Port Arthur.

The refinery docks on deep water receive and load tank and package ships from all parts of the globe. Some of the ships come in ballast, that is, without cargo. When they do this ballast has to be unloaded to make room for the goods to be carried on the return trip. There is an area alongside the docks that has been filled in with this discharged ballast.

There is in this fill sand from the Bay of Naples, earth from the British Isles, from the Falkland Islands, from various South American countries, from France and from Japan.

A New Refinery Likely in Venezuela

WHETHER the Pan American Petroleum & Transport Co. will build a refinery in Venezuela to handle, near the source, the crude produced on the company's acreage in that country is still unsettled according to Beaumont Parks. I talked to Mr. Parks the other day in Chicago. Mr. Parks is the director in charge of refineries of the Standard Oil Co. of Indiana which owns control of the Pan American.

Negotiations in foreign countries are often long-winded and attended by many surprises and disappointments, according to Mr. Parks.

Explosion Causes Refinery Shutdown

THE latest news from Boston is that the common council, or whatever they call the city legislative body of Everett, Mass., has revoked or suspended the permit of the Beacon Oil Co. to operate its refinery in Everett, where the explosion occurred in a Tube and Tank cracking unit two weeks ago.

So far as we have heard the townspeople ought to be reassured rather than otherwise as a result of the explosion, because the fire was kept within the bounds of the refinery property and did no damage in the town. The information is that the refining company will be given a chance to present its side of the case at a hearing March 1.

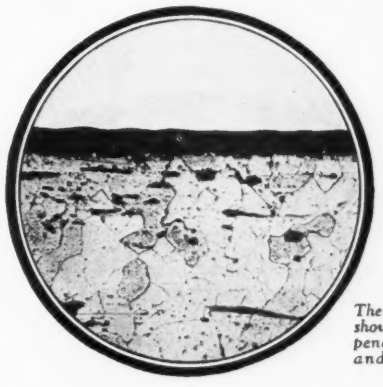
Texas Co.-Dubbs Suit Comes Up

MARCH 5 has been set as the date and Newark, N. J., as the place for hearing of the suit brought by The Texas Co. against the Warner-Quinlan Co. This suit charges that use of the Dubbs cracking process by the Warner-Quinlan Co. constitutes infringement of the Adams patents owned by The Texas Co.

This will be an attack on Dubbs from a new direction and should prove interesting, especially in view of the fact that there is litigation now in progress between the Dubbs interests and The Texas Co. on the feature of clean reflux from dephlegmator into the charging line which is common to Dubbs and Holmes-Manley processes.

Amaloy Coated Pipe

A New Reading Product



The Photomicrograph shows how Amaloy penetrates the iron and anchors fast.

HERETOFORE protective coatings as a protection against the inroads of corrosion have been unsatisfactory. They were either not sufficiently adherent or were porous.

Reading Iron Company announces that its Amaloy Coated Pipe will resist acid corrosion to the nth degree. We advocate its use wherever corrosive conditions are extreme, for by every conceivable test—tortional, tensile and flattening—it fulfills our expectations. Amaloy actually anchors itself into the body of the metal. Nothing seems to dislodge it. All threads on pipe and couplings are completely coated. We are prepared to furnish Amaloy Coated Pipe for Tubing, Casing and for Refinery Service.

READING IRON COMPANY

Reading, Pennsylvania

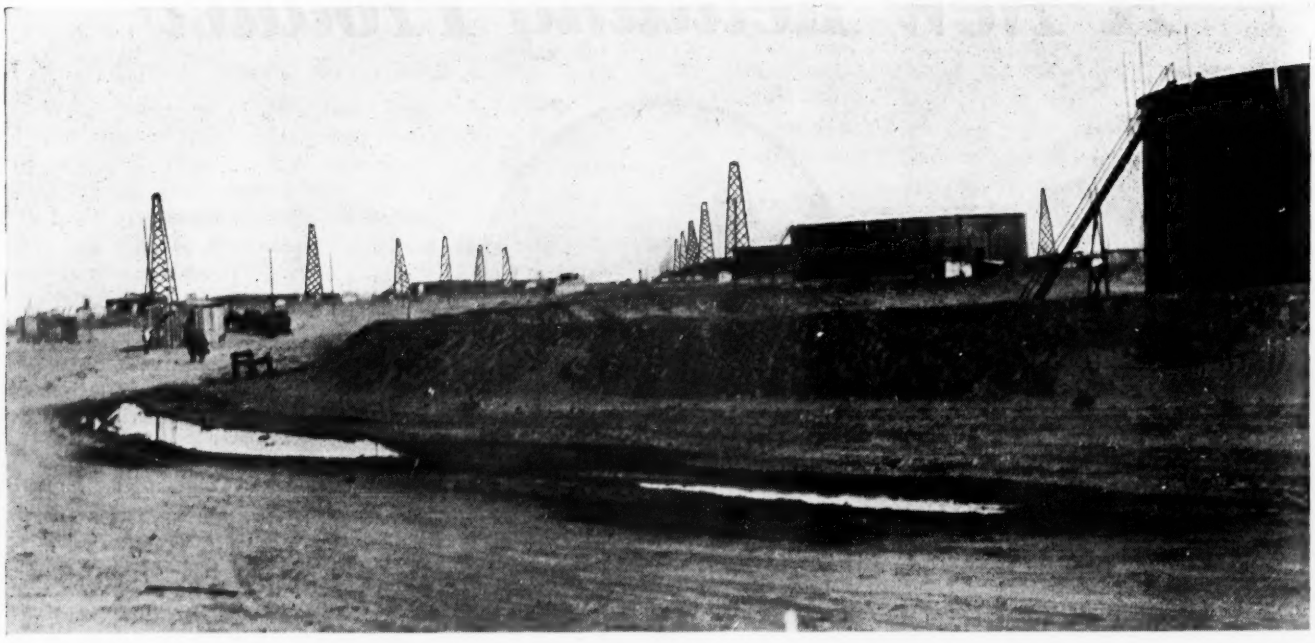
HOUSTON TULSA FORT WORTH LOS ANGELES SAN FRANCISCO

READING PIPE

AMALOY COATED

GENUINE WROUGHT IRON

Shifting Sand Dunes Add to Perils Of West Texas Field Trip



Looking east along Cowden excess survey strip, which separates University field and McElroy ranch developments in Crane County, Texas. Note row of wells staggered alongside battery of 55,000 barrel steel tanks of Landreth Production Co.

THE visit to the University-McElroy fields is described by Mr. Wagner in this current article based on data gathered on a recent trip through 1000 miles of West Texas territory. His article in the Feb. 15th issue told of the Yates pool late developments.

By Paul Wagner

N. P. N. STAFF WRITER

THE even tenor of this narrative was rudely broken when the demands of space last week left my traveling companion and I at McCamey, Upton county, on our "Detouring west Texas" trip.

Our progress north and west in the Permian salt basin oil producing region of west Texas was also put aflutter at McCamey, for a period of almost 12 hours. This delay resulted from an unfounded rumor borne by a traveling salesman that a 16,000-barrel discovery well had been completed in an isolated district of western Crane county, far removed from other development. This crisis passed we bumped northward through eastern Crane county to Crane City, the focal point of human interest and its concomitant evils for the University (Church & Fields) and McElroy ranch oil fields.

Before leaving the McCamey district we made the notation in our notebooks that there had been produced roundly 8,400,000 barrels of crude from 311 wells, averaging 51.30 barrels daily, to Jan. 1, 1928. We marveled again at the growth of McCamey from a bald spot on the prairie two years ago to a thriving oil boom town of several thousand souls now.

The principal industry at McCamey is the Humble Oil & Refining Co.'s 10,000-barrel topping plant, which later in January was damaged about $100,000 by fire originating at a finished gasoline storage tank. Other activities centering in or near McCamey are operating bases and tank car loading facilities for crude shipped from the territory by various oil interests which are yet to construct trunk outlet facilities from the region.

In the heart of the field we found preliminary churn drill operations under way on the Sun Oil Co.'s Burleson lease, in sec. 100, for a government supervised potash test to be put down under contract by the Pennsylvania Drilling Co., of Pittsburgh. When this test has been completed, on a site designated by the United States Geological Survey, the drill will be removed to the Roxana Petroleum Corp.'s Hughes lease, in William Teer sec. 4, for another sampling operation.

The top of the potash-bearing salts found in the McCamey area lies at a drilling depth of about 500 feet below the surface. There, as at Big Lake and elsewhere in the Permian basin province, exists a supply of commercial fertilizer the federal government hopes to make available to the American farmer; thereby freeing him from dependence on the European potash trust.

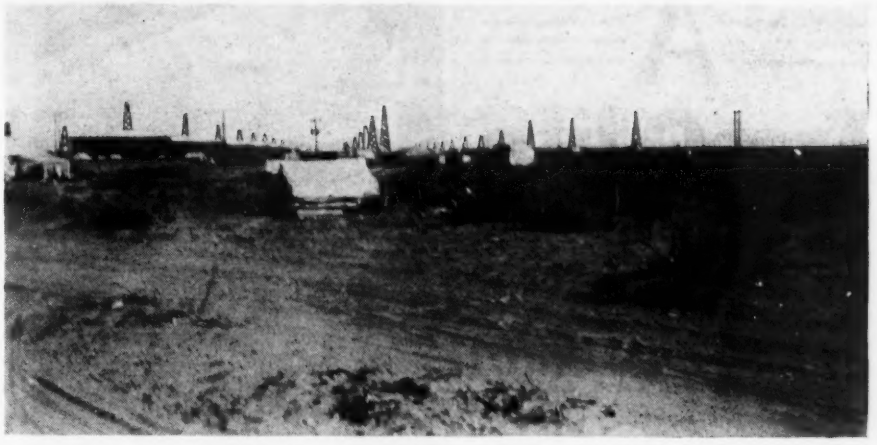
OUR drive to the University-McElroy area brought us into big well oil territory again. There we found 54 wells of the Gulf Production Co., on its 27-section McElroy block, producing an average of 322 barrels daily, or a field total of 17,940 barrels, under restrained development. Immediately adjacent on the north, the University field had 170 wells totaling 87,500 barrels daily, or nearly 515 barrels average.

The Gulf's McElroy field is treated as a separate development from the University area mainly because of its acreage control. Structurally, there is a definite connection between them. The McElroy ranch area, with its estimated 100,000,000 barrels ultimate yield, has undergone little drilling except along its north boundary. There, a row of wells has been drilled by the Landreth Production Co., on a narrow excess survey strip that is wide enough only for the staggering of a single line of completions alongside a battery of 55,000-barrel steel storage tanks several miles long.

Three rows of wells have been drilled by the Gulf along its north boundary to protect against possible drainage at the lime producing level,

found at drilling depths ranging from 2750-2850 feet. North of the Landreth strip, in the University field, other operators have drilled offsets also to protect against possible drainage.

The flush yield period of the University field is now past, although drilling has not been carried far enough to either the north, the west or the east to delimit the possible productive area. Many of the wells are now showing water, after having been drilled into either bottom hole water or shot into it with nitro-glycerin to increase daily yields. It has been customary to shoot University field wells with 150 to 300 quarts, which often resulted in production being trebled.



Scene shows two of the three rows of wells drilled along north boundary of the Gulf's McElroy ranch property to protect against possible University field drainage

IN THE University field was committed an error of judgment. My companion and I essayed a voyage upon an undulating sea of sand to inspect, if happily we might, the status of developments in the northeastern part of the field. We did see something of the development, but for the greater part of our stay in this part of the field our vision was limited to the bottom of a sand draw in which our ordinarily trusty Buick elected to bide-a-wee.

With the assistance of a half dozen 2x6's, a joint of 2-inch pipe, much assorted shoving and a modicum of profanity, we succeeded after an hour in getting the car on solid ground again. No more had we finished than a team of husky mules hove in sight.

Although their late appearance on the scene tended to cause some caviling at the vagaries of fate, these vestiges of an earlier era of locomotion came in rather good stead; we were told it would be impossible to move in any direction under our own power.

With the kind assistance of our informant and the two representatives from Missouri we were ignominiously dragged to a position where we could again proceed unassisted.

We circled the "monahans", or shifting sand dunes, and turned again northward to Odessa, the seat of government of Ector county, which is also the Texas & Pacific railroad point for the University-McElroy district.

There, at Odessa, we were back on the main highway with pavement to temporarily relieve us of uncertain road conditions and the more aggravating onslaughts of dust. Our reprieve, however, was short at best; we must needs turn north again at Pyote, Ward county, on what passes for the main highway to Wink, the most active boom town we saw in west Texas.

Traveling by motor from Odessa to Pyote one passes through the currently most interesting area of oil activity in the salt basin region. To the south, at a point west of Odessa, one may view in the distance the development of The Texas Co., on the Connell ranch, which was taken over last July under an operating agreement after the drilling of two small producing wells by J. S. Cosden, Inc. The Texas Co. is keeping one rig running on the Connell block. North or northwesterly, depending upon the nearness of the traveler's approach to Pyote, the Hendricks field, of Winkler county lies across a seemingly impenetrable waste of sand dunes spotted by occasional vegetation.

Between Odessa and Pyote, both Texas & Pacific railroad points, are the towns of Judkins, Monahans and Wickett. There also traffic has paused in the past. Now more attention is being paid them, especially Monahans and Wickett.

Monahans, which takes its name from the shifting sand dunes of the region, is one point of entry to Winkler county oil development, to the northwest. It is at this point that the Humble Pipeline will connect its Hendricks field facilities with pipeline construction southeasterly to Crane and Upton counties, centering at McCamey.

The Shell Pipeline Corp., companion to the Roxana Petroleum Corp., also has a 6-inch welded line from Hendricks field to Monahans as a part of its west Texas crude gathering facilities. When completed the Shell's gathering facilities will form a part of its pipeline system from west Texas to Healdton, Okla.

Wickett, named after the chairman of the board of the Pan American group companies, is the west Texas operating base of the Southern Crude Oil Purchasing Co., and the Southern Pipeline Co., both subsidiaries. Their Hendricks field operations are on sufficiently large scale that Wickett, where tank car loading racks are located, has assumed an important industrial aspect. Also, there is at Wickett a 3,000-barrel topping plant of the Blue Bonnet Refining Co., which gets its crude supply from the Pan American subsidiaries.

Pyote, where my traveling companion and I turned off the highway again into the uncharted perils of Winkler county, is the point to which Independent Oil & Gas Co. is building its 8-inch short pipeline from the Hendricks field to a 75-car loading rack on the Texas & Pacific. There are found also a number of small supply depots, the usual bustle of oil country activity and the gateway of travel to the Hendricks field that is most generally used.

THE road from Pyote leads to the inland town of Wink, which was built up from zero in the edge of the Hendricks field. There a drilling campaign of considerable consequence is in progress, bringing an influx of various classes of oil field workers and habitues. The greater number of men required for Hendricks field development is due in large part to the fact that drilling there is accomplished with heavy type equipment in contrast with the spudding machine and portable rig operations of the Yates field in Pecos county.

Between Pyote and Wink is a series of sand beds, with intervening patches of caliche. It is impossible to say which is the worst. Another road leads from Monahans to Wink. It makes no difference which the weary traveler may take; he will wish he had gone the other.

No more fitting place can be imagined for the holding of a Shrine ceremonial than this particular part of west Texas. There are burning sands in abundance, bearing ample difficulties for him who would fain traverse them and in quantity to shame the ingenuity of man to provide additional tortures.

Again, in the Hendricks area, one dares not venture far afield in truck or car. Hauling from Wink to the various scenes of operation is done in large part by means of that sturdy beast of burden that Erwin S. Cobb so aptly described as "without pride of ancestry or hope of posterity." The reason is sand, sand and ever more sand.

(To Be Continued)

A Tret-O-lite Plant *is NOT expensive*

Operators usually can arrange a Tret-O-litE plant, using equipment already on the lease. No heavy initial investment—no expensive equipment to stand idle when need for large treating capacity has passed.

The Tret-O-litE method is the fast, economical and THOROUGH method of recovering oil from emulsions.

WM. S. BARNICKEL & COMPANY
St. Louis, Mo.

Tret-O-lite

Money-savers on every paint stripping job!

WHETHER it's removing paint from large storage tanks, tank cars, delivery trucks or oil drums, Oakite stripping materials are noted for their ability to do the work quickly and economically.

Next time you have a paint removing job, large or small, call in the Oakite Service Man. His suggestions are certain to save you money. A card addressed to us places him at your disposal.

Oakite Service Men, cleaning specialists, are located in leading industrial centers of U. S. and Canada.

Oakite is manufactured only by
OAKITE PRODUCTS, INC.
42C Thames St., New York, N. Y.

OAKITE
Industrial Cleaning Materials and Methods

WILLIAM B. SUTTON

Vacuum Promotes Sutton; Brower Retires

HOUSTON, Feb. 2.—Appointment of William B. Sutton as general manager of the crude oil department, southwestern division, of the Vacuum Oil Co., Houston, brings merited recognition to an executive widely known in the Mid-Continent. Mr. Sutton had been manager of the Vacuum's land department at Houston, since resigning from the Prairie Oil & Gas Co., at Tulsa, about three years ago.

A new operating policy of the Vacuum has been put in effect, coincident with the retirement of W. C. Brower, manager of the crude oil department at New York, and Mr. Sutton's promotion at Houston. William A. Vinson of the law firm of Vinson, Elkins, Sweeton & Weems, Houston, had been in charge of a Texas-Louisiana operating committee. Mr. Vinson continues to handle legal affairs of the company in the southwest, but greatly enlarged authority now is vested in the new general manager.

Mr. Sutton announces there will be no organization changes at Houston in connection with his appointment. He will continue to be nominal head of the land department, with Col. J. R. B. Moore assistant manager. W. C. Thomas, general production superintendent, and Paul Brower, his assistant, will function as formerly.

C. W. Hadley, chairman of the Vacuum's manufacturing committee, will be in charge of all crude oil affairs centering at New York headquarters.

The retirement of Mr. Brower as crude oil manager follows more than 40 years of service. It is announced from New York that he was granted a year's leave of absence after which he retires at the maximum provided for in the company's pension plan.

Tulsa Shows 95% Increase in Permits

TULSA, Jan. 16.—The city of Tulsa made a substantial growth in population, building activity and financial strength in 1927 in spite of the low prices for petroleum and its products. Annual reports of the banks, post office, public utilities and the like all show gains.

The most remarkable gain made by the city was in building activity. Building permits issued during the year authorized the construction of buildings to cost $14,840,000 as compared with $7,615,000 in 1926, a gain of 94.87 per cent. The year saw the construction of the Philtower, new 23 story office building built by Waite Phillips and the beginning of work on an addition of similar size to the Exchange National Bank building.

Bank deposits at the six national banks increased more rapidly than the loans and discounts in spite of the oil depression. At the beginning of the year bank deposits totaled $90,124,786.66 while at the close of the year the total had grown to $96,769,637.71, an increase of 7.37 per cent. The two largest banks of the city, the Exchange National and the First National which are generally looked on as the oil banks, showed an even greater increase in deposits than the others. Combined deposits of the two chief oil banks were $64,364,974.48 on Dec. 31, 1926 and $71,260,548.75 on Dec. 31, 1927, an increase of 10.71 per cent.

Total debits to individual accounts for the year showed a smaller percentage of increase. In 1926 bank debits totaled $1,533,990,381 and in 1927 this increased $38,318,412 or 2.49 per cent to $1,572,308,795. In 1925 debits totaled $1,274,475,900. Total loans and discounts reported by Tulsa banks on Dec. 31, 1926, were $51,296,695.87 and on Dec. 31, 1927, the total was $54,204,605.05, an increase of 5.66 per cent.

Postal receipts at Tulsa fell just short of the million dollar mark in 1927. The total was $928,752.66 as compared with $816,721.50 in 1926, an increase of 13.72 per cent. The assessed valuation of city property increased $15,400,000 during the year to $118,240,110, an increase of 14.08 per cent. Property is supposed to be assessed at about half its market value in the city.

Indications of population growth are seen in the increases in telephone installations and meters for water, electricity and gas. Gas meter installations increased 6.27 per cent, telephones 8.81 per cent, water meters 10.12 per cent and electric meters 11.41 per cent. Real estate activity during the year is indicated by an increase of 13.22 per cent in the number of warranty deeds recorded.

Performance Likely to be Market Gauge For Gasoline of Tomorrow

By Dr. George Granger Brown*

Part II

REFINERS now recognize the importance of partial volatility and many of them are actually producing fuels that give easy starting and good acceleration on motors such as were available even before the World War. Recent surveys of motor fuel marketed throughout the country clearly indicate the present tendency to supply fuels of greater volatility in the first part of the distillation or of high partial volatility at low temperatures. Such fuels exert a greater vapor pressure and have a greater tendency to vaporize which occasionally causes gassing in carburetors which are highly heated. We have measured temperatures of the gasoline in the bowl and fuel ducts of the carburetor on a standard equipped car under actual driving conditions with atmospheric temperature of 80 degrees Fahr. as high as 178 degrees Fahr. It seems obvious that fuels giving easy starting and having an initial boiling point on the A. S. T. M. distillation of about 95 degrees Fahr. will vaporize in the carburetor if the fuel is heated to temperatures much over 150 degrees Fahr.

Even if the fuel does not possess a high vapor pressure or tendency to form vapor, but does have a rather low dew point or equilibrium dry point as indicated by a low 90 per cent point on the A. S. T. M. distillation, another difficulty is experienced when used on motors which supply a large amount of heat to the intake manifold. Apparently such a fuel forms a dry mixture at a relatively low temperature (100 to 120 degrees Fahr.) and the additional heat supplied by the exhaust jacketing of the manifold serves simply to superheat the mixture in the intake manifold. This super-heating causes a loss in power, and an increase in fuel consumption particularly at part-throttle, because it serves no useful purpose in improving distribution but decreases the volumetric efficiency of the motor.

Hot Manifolds Increase Knocking

THE heating of the charge as it passes through the intake manifold made necessary by the relatively low volatility of motor fuels available in the last few years introduces another difficulty as heating the mixture increases the tendency of that mixture to knock or detonate in the explosion chamber. Apparently this increase in tendency to knock due to heating the charge as it passes through the intake manifold is due both to the increase temperature of the mixture and to the fact that better distribution is obtained if the mixture is reasonably dry.

The mixture which detonates worst, is the best mixture for maximum power with good fuel economy. Accordingly if the mixture is not heated so as to be practically dry, we find uneven distribution to the different cylinders actually decreasing the tendency of the fuel to detonate because one cylinder will get a slightly rich mixture while another cylinder will get a slightly lean mixture. As mixtures both richer and leaner from the ideal mixture show less tendency to detonate, it is obvious that such conditions tend to decrease the knocking tendency of the fuel when used in a motor which does not heat the charge to a very high temperature.

Uniform Fuels vs. Uniform Motors

At various times we hear state-

*Professor of Chemical Engineering, University of Michigan, and Director of Research, Natural Gasoline Association of America.

Fourth Stage Developing in Motor Fuel Market

THREE stages in the development of the motor fuel market were described by Dr. Brown in the first part of his article, which is concluded in this issue. The first stage was from the invention of the automobile down to the early years of the World War. Gasoline's status changed then from that of a by-product in the manufacture of kerosene to the chief petroleum product. The supply obtained by ordinary distillation of petroleum was sufficient to meet the increasing demand. Automobile engines had compression ratios comparable to the compressions of the new engines of today.

Motor vehicles became so numerous in the later years of the World War and in the boom years afterward that it was necessary to cut more deeply into the crude oil for gasoline and to crack the heavier oils for motor fuel. This involved a radical change in the type of automobile engines. Piston displacements were enlarged and compression ratios lowered. This was the second stage of the motor fuel market.

About 1922 with the introduction of ethyl gasoline, the third stage of development was entered—the stage of high compression fuels.

What will be the fourth stage? What property will be demanded by motor car users in the next few years—what will be the gasoline of tomorrow? Dr. Brown in the first part of this article, published in the Feb. 15 NATIONAL PETROLEUM NEWS, laid the historical background for his prediction which he gives with the underlying reasons in this issue. Be sure to get this background in last week's issue; then open the door with Dr. Brown and take a peep at the gasoline motorists will require tomorrow!

A Diamond —and its demands

When an engineer sees the Jenkins "Diamond", he can be sure that the valve on which it appears has met severe demands and has satisfied exacting requirements.

In the making of a Jenkins Valve, demands are made first of all on the metal; and it must be proved by analyses both before and after casting.

Demands are made of the design; it must provide strength in every detail. Demands are made of the finished valve; it must pass a test which allows a wide safety margin.

At supply houses everywhere.

JENKINS BROS.

80 White Street.....New York, N. Y.
524 Atlantic Avenue.....Boston, Mass.
133 No. Seventh Street...Philadelphia, Pa.
646 Washington Boulevard....Chicago, Ill.

JENKINS BROS., Limited
Montreal, Canada *London, England*

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

Don't Forget—
Filtration Gives Sparkling Clear Liquids

SOMETIMES in process work, this important factor is overlooked—

filtration provides clear liquids and well washed solids.

Filtration is always a good way of separating solids from liquids; in many cases, it is the best way.

Filtration is a subject our engineers know considerable about. Call on them for advice.

United Filters Corporation

Hazleton, Pa.—Los Angeles Office, Central Building
Other Offices in Chicago—New York—Salt Lake City
Export Office—25 Broadway, N. Y.—Code Address, Unifilter, New York

BETHLEHEM
WAX PLANT EQUIPMENT

Filter Presses *Wax Moulding Presses*
Wax Distillate Chilling Machines *Scale Wax Cooling Drums*
Wax Testing Presses *Paraffine Wax Sweater Plants*
Complete Wax Plants designed and built
Pumps, Stills, Towers, Condensers and other Oil Refinery Equipment
Oil Burning Systems *Complete Power Plant Equipment*

BETHLEHEM STEEL COMPANY, *General Offices, Bethlehem, Pa.*

District Offices
New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco Los Angeles Seattle Portland

ments that it would be very desirable if all of the fuels sold throughout the country were absolutely uniform so that the automotive engineer could design his motor to handle a uniform fuel with reasonable assurance that such a fuel would be generally available. This request seems to me to be a perfectly reasonable request but for some reasons rather a difficult proposition for the oil industry.

On the other hand it seems to me to be a perfectly reasonable request from the oil industry that the automotive engineer adopt one uniform type of motor with about the same degree of heating on the manifold so that the oil industry can market one uniform fuel to give the proper performance on all motor cars.

So far the two industries have not succeeded in meeting on a common ground in supplying either the uniform fuel or a uniform motor. Perhaps in the interest of progress it is highly desirable that no standard fuel and no standard motor be adopted.

The Necessary Compromise

IN ANY case it appears necessary that the motor fuel possess such characteristics that it has sufficient volatility to start and operate those cars which supply the least amount of heat to the mixture and sufficiently low dew point as not to produce extremely wet mixture. On the other hand these fuels must not possess sufficiently high tendency to vaporize as to cause gassing in the carburetors nor sufficiently low dew point to allow the formation of super-heated mixtures on those motors which supply a large amount of heat to the manifold or carburetor. The difficulty of meeting these specifications is largely that we do not know exactly what the specification should be.

The petroleum industry is now investigating carefully the relationship of vapor pressure, volatility, dew point and similar characteristics to motor performance and we should expect within a few months or years to know what are the proper specifications for motor fuels to be used on motors which supply a certain amount of heat to the intake manifold. Perhaps after this information is readily available it will be possible for the motor and oil industries to agree on specifications for manifold heating and motor fuel characteristics.

The Importance of Anti-Knock Value and Compression Ratio

The performance of a motor car can be increased by increasing the compression ratio of the motor, or without change in compression ratio by increasing the piston displacement per revolution of the driving wheel. The latter increase may be obtained by either increasing the speed at which the motor operates for a given car speed, or by increasing the bore

of the motor without changing the rear axle gear ratio.

Improved Car Performance by Increased Displacement

THE former method of increasing displacement is widely used in England largely because taxes on motor vehicles are based upon the size of the bore. In this country both methods have been used depending upon the policy of the manufacturer. The former method is a more economical method for the motor manufacturer because it does not involve retooling his factory for producing a motor of a larger bore. It means simply different valve timing and relatively minor changes in the construction of his motor. However, a point is soon reached where the increased speed of the motor introduces difficulties in lubrication and losses in increased wear and friction of the moving parts, so that it is very doubtful if the motor manufacturers will appreciably increase the motor speeds above the high speeds now in use.

A very suggestive article by W. S. James in the January issue of the Journal of the Society of Automotive Engineers, brings out the relative advantages and disadvantages inherent in these different methods of increasing the engine displacement.

Improved Car Performance by Increased Compression Ratio

BOTH of these methods of increasing car performance invariably increase the fuel consumption, because with the increased engine displacement a greater volume of explosive mixture must be fed to the motor for each revolution of the rear wheel. On the other hand an increase in the compression ratio of the motor increases the power and car performance and also increases the efficiency of the motor or the miles obtained per gallon of fuel with an increased car performance. For this reason it is clear why so much emphasis has been placed upon an increase in compression ratio by the automotive engineers.

Relative Costs of Improving Car Performance

IT MAY be of interest, however, to compare the relative increase in fuel consumption or decrease in mileage brought about by an increase in the rear axle ratio or in piston displacement sufficient to give the same increase in performance as a specified increase in the compression ratio.

Using for the basis of comparison the data reported by Mr. James, which are based upon a motor having a piston displacement of 100 cubic inches, a rear axle ratio of 3 to 1, a compression ratio of 4 to 1, and a car weight of 3,500 pounds, and which are found to agree closely so far as changes in compression ratio with similar data reported by Ricardo, we find:

1. An increase in compression ratio of 20 per cent, that is, from 4 to 4.8, brings about an increase in mileage per gallon of gasoline of about 14 per cent accompanied by an increase in performance at 20 miles per hour that can be equaled without change in compression ratio only by increasing the rear axle ratio about 12 per cent with a corresponding decrease in mileage per gallon of gasoline of about 9 per cent, or by increasing the piston displacement with a constant rear axle ratio by about 9 per cent which brings about a decrease in mileage per gallon of about 4 per cent.

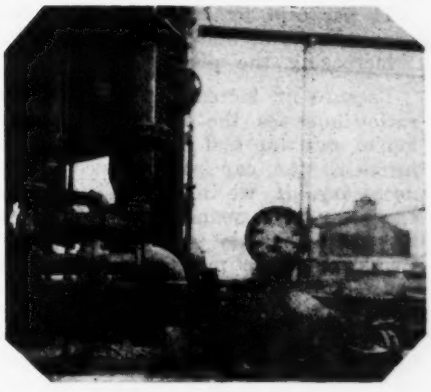
Adding the decrease in mileage per gallon brought about by an increase in rear axle ratio, or an increase in piston displacement to the increase in mileage per gallon brought about by an increase in compression ratio, we find that we can produce a car having the same performance as that obtained by a 20 per cent increase in compression ratio without change in the compression ratio but with a decrease in mileage compared to that obtainable with the motor of higher compression ratio of about 23.5 per cent, if the improved performance is brought about by an increase in the rear axle ratio, or a corresponding decrease in mileage per gallon of 16 per cent if the improved performance is brought about by increasing the piston displacement with a constant rear axle ratio.

2. If the compression ratio is increased 20 per cent from 5 to 6, the mileage per gallon is increased about 10 per cent, with an improvement in performance that can be obtained without change in compression ratio only by a sacrifice of about 6.75 per cent mileage per gallon if the rear axle ratio is increased, or by a sacrifice of about 4.2 per cent in mileage if the piston displacement is increased with a constant rear axle ratio.

Adding these losses in mileage to the increase in mileage brought about by an increase in compression ratio from 5 to 6, we find on the same basis as used above that the mileage is decreased by about 19 per cent if the improved performance is brought about by an increase in rear axle ratio, or 13 per cent if the improved performance is brought about by an increase in piston displacement with a constant rear axle ratio.

3. If the compression ratio is further increased from 6 to 7 to 1 we find that the mileage is increased about 7 per cent and that the improved performance can be equaled without change in compression ratio only by a corresponding decrease in mileage per gallon, based on

NIAGARA METER TRAVELS



No. 6
Wichita, Kansas

Travel where you may throughout the west and you'll find that nearly every large refinery is a Niagara Oil Meter user. In Wichita, Kansas, for instance, one of the largest refineries in that section is using Niagara Oil Meters throughout their plant. The photograph above shows a Niagara Oil Meter of the 3 inch G type which is used for measuring gasoline to an acid treating unit.

* * * * *

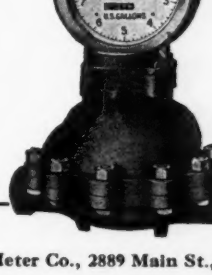
Wide-awake refiners and marketers everywhere have been quick to realize the real value of Niagara Oil Meters. They know that automatic measuring of gasoline, kerosene, alcohol, lubricating oils, crude oils or fuel oils can be best accomplished with Niagaras. Years of constant operation under the most trying conditions have proven their ready adaptability to measuring petroleum products accurately and dependably and at the lowest possible cost of upkeep.

No matter what branch of the petroleum industry you are in there are sizes of Niagara Oil Meters that will definitely meet your individual requirements. The coupon will bring you full information. Mail it today!

BUFFALO METER COMPANY
2889 Main Street — Buffalo, New York

Niagara Oil Meters

Sizes from ¼" to 6"



Vertical or Horizontal Dials

Buffalo Meter Co., 2889 Main St., Buffalo, N.Y.

Please send us a free copy of your Niagara Oil Meter booklet and full information regarding the adaption of Niagaras to our business.

Name.....

Type of Business.....

Address.....

.....

that obtainable from the 7 to 1 compression ratio motor, of about 11 per cent by increasing the rear axle ratio, or about 8.5 per cent by increasing the piston displacement.

Because an increase in compression ratio improves the mileage per gallon of gasoline and at the same time increases the car performance, it is necessary, if we are to obtain the same car performance by an increase in rear axle ratio to tolerate a relative decrease in mileage of about 24 per cent if the improved performance is brought about by increasing the compression ratio from 4 to 4.8 to 1, or we may bring about the same improvement in performance by increasing the piston displacement with a constant axle ratio, thereby mileage of only about 16 per cent in mileage based on that obtainable from the higher compression motor.

IT IS much simpler for the car manufacturer to increase the rear axle ratio than to redesign the larger motor of greater piston displacement and to retool his factory for the production of the larger motor. For this reason we find that most of the improvements in car performance have been brought about by an increase in axle ratio rather than by an increase in piston displacement with a constant rear axle ratio. It appears now that with rear axle ratios running frequently as high as 5 to 1, that the practical maximum improvement in car performance that can be obtained by an increase in rear axle ratio has been reached, and that any further improvement in car performance must be based upon either an increase in compression ratio, or an increase in piston displacement.

Here again the same forces apply as it is obviously much simpler and more economical for the car manufacturer to increase the compression ratio of his motor than to build a larger motor. This is particularly desirable as an increase in compression ratio further increases the mileage per gallon while an increase in the piston displacement to obtain the same relative improvement in performance causes a decrease in the mileage per gallon.

Let us assume, however, that the improvement in performance could be brought about by an increase in piston displacement, and compare the relative fuel cost using the ordinary gasoline in a car equipped with greater piston displacement, with the use of a premium gasoline of high anti-knock value in the car equipped with a motor of higher compression ratio. We shall assume a benzol value of 0 for ordinary gasoline, which represents the low limit of ordinary gasoline now on the market, and a benzol value of 45 for the premium anti-knock fuel. Few fuels now on the market show a benzol value of greater than 45 and the majority of the premium anti-knock fuels show a benzol value of about 40 to 43, so that we are making at least a fair allowance for possible increase in compression ratio by use of premium fuel.

As a benzol value of 45 allows an increase in the compression ratio of about 20 per cent over that allowed by a fuel possessing zero benzol value, it is seen that if the motor is designed so that it can operate only on a 4 to 1 compression ratio with ordinary gasoline, we can afford to pay a 19 per cent premium for a fuel possessing an anti-knock value of 45 benzol if the gasoline sold at the posted price possesses 0 benzol value.

If, however, the automobile motors are designed so that they can handle the ordinary gasoline of 0 benzol value at a compression ratio of 5 to 1, we can then afford to pay a premium of only 15 per cent for a motor fuel having a benzol value of 45. If the efficiency of motor design is so increased that the compression ratio of 6 to 1 can be handled by the ordinary gasoline of 0 benzol value, we can afford to pay little more than 9 per cent premium for a motor fuel possessing a benzol value of approximately 45.

At the present time ordinary gasoline sold at the posted price frequently possesses a benzol value of over 20 and in some places over 30. As a benzol value of 20 indicates an increase in the highest useful compression ratio of about 5 per cent it is seen that the premium anti-knock fuels possessing benzol value of about 45 do not allow an increase in the highest useful compression ratio of much over 15 per cent as compared to the average motor fuel now obtainable at the regular price.

We are now paying a 3-cent premium for anti-knock fuels which corresponds to about 15 per cent based on the present selling price of ordinary U. S. motor fuel. The above calculations suggest then that there is an economical advantage in purchasing high anti-knock fuels at a premium of 3 cents, only if the motor design allows the use of a compression ratio not exceeding about 4.8 when using a fuel of 0 benzol value.

AS THE ordinary U. S. motor fuel now on the market exceeds 0 benzol value in anti-knock properties and we now have available motors of 5.5 to 1 compression ratio in quantity production which can be operated on ordinary gasoline as standard production, it seems that the industry has already reached that condition of economic balance where there is neither economic gain or loss in paying 3 cents premium, about 15 to 16 per cent of the posted price, for anti-knock fuels to be used in motors having compression ratios greater than 5.5 to 1. If the price of gasoline goes up appreciably so that the 3-cent premium represents a smaller percentage in the total purchase price, or if the motors become less efficient, there may then be greater economic advantage in the use of fuels of high anti-knock value in high compression motors at an increased cost of approximately 3 cents a gallon.

It seems more reasonable to expect, however, that the efficiency of design of the combustion chamber of the motors will increase rather than decrease, so that it will be necessary for the selling price of gasoline to increase appreciably simply to maintain the economic balance between the increased cost of using fuels of high anti-knock value in high compression motors and the decreased mileage obtained in motors of greater displacement.

AS HAS been suggested, there is another consideration which enters as an important factor at least from the standpoint of the automobile manufacturer. The compression ratio of a motor can be increased, with an increase in performance and mileage, without any expensive change in design or factory production equipment if the efficiency of the combustion chamber regarding knocking is appreciably increased or fuels of high anti-knock value are available; while to increase the piston displacement it is necessary to retool an important and expensive part of factory production equipment.

The public must pay a premium somewhere for increased performance, either to the fuel producer for a high anti-knock fuel that can be used in high compression motors or for greater fuel consumption in motors of greater displacement and to the motor car manufacturer for the expense of changing his equipment to produce motors of larger bore and greater piston displacement, unless motors of improved design are available which can be operated at higher compression ratios on ordinary gasolines.

Concerning the relative advisability of depending upon high anti-knock fuels or more efficient motors, a paper presented before the Institution of Automobile Engineers in March, 1927, by H. R. Ricardo is of interest in indicating the possibilities in the latter method. Ricardo seems to be firmly convinced that it is not economic to pay a premium for high anti-knock fuels, but that the solution of the problem rests entirely with the automobile manufacturer in the design and use of the combustion chambers of greater efficiency which will allow the use of ordinary fuels at higher compression ratios. He wrote:

"We can suppress detonation by:

1. The use of metallic dopes in small quantities, such as lead ethide, or iron carbonyl, etc.
2. The use in considerable quantities of fuel of high ignition

Announcing

FLUID-FUSION

Trade Name
of the Electric Welding Process
developed and used by

P. I. W.

in the manufacture of

Pressure and Temperature Vessels
and
Corrosion Resisting Equipment
in
Chrome Iron or Stainless Steel

P. I. W. Products

WELDED VESSELS
STILLS
PROCESS INDUSTRY EQUIPMENT
ELEVATED WATER TANKS
OIL REFINERY EQUIPMENT
"PENNSYLVANIA" TANK CARS
SMOKE STACKS
STAND PIPES
WELDED PRESSURE PIPE
STEEL BARRELS
GENERAL STEEL PLATE CONSTRUCTION

The FLUID-FUSION Process

The P.I.W. "FLUID-FUSION" process is automatic and produces an exactly uniform and homogeneous weld in which the variable human element is entirely eliminated. The process is such that the molten weld metal being deposited is prevented from absorbing oxygen and nitrogen from the air. Tension and torsion tests conducted on regular production are guaranteed to exceed the strength of the plate itself, with the tensile strength curve declining gradually from its peak in the weld to the rated plate strength at points several inches distant on each side of the weld. Size and contour of vessels manufactured with this process have been limited only by transportation restrictions. So far no commercial use has been found for the ultimate wall thickness guaranteed by P.I.W. for the "FLUID-FUSION" weld.

Write for further particulars and details of tests. P.I.W. engineers will gladly study your problem.

The Petroleum Iron Works Co.

Sharon, Penna.

NEW YORK CHICAGO HOUSTON TULSA

Branch Plant: Beaumont, Texas

GREASE COMPOUNDING MADE EASY!

A new book "GREASE COMPOUNDING MADE EASY" by Forrest A. Hoff is just out. Contains 100 certified grease formulas, with full instructions as to their manufacture and uses.

Explains the only two methods of making Cup Greases and gives Formulas for: Brick greases, Fibre greases (8 grades); Transmission grease; Cup grease (8 grades); Double decomposition grease; Ford non-chatter base; Heavy auto oil; Medium auto oil; Light auto oil. All Formulas figured in one-barrel batches.

A laboratory analysis of only one grease sample costs $25.00. In GREASE COMPOUNDING MADE EASY you get 100 certified grease formulas for $25. This includes instructions how to make them, so simple that any one having steam and a kettle and following directions carefully, will have good success in manufacturing greases.

Refiners, Compounders and Jobbers interested in making their own greases will find this book "GREASE COMPOUNDING MADE EASY" a profitable investment.

Send check for $25, and this book with 100 Grease Formulas will be mailed you promptly.

NATIONAL PETROLEUM NEWS

1213 W. 3rd St., Cleveland, O.

point, such as benzol and other aromatics, naphthenes, alcohol, etc.

3. The design of the combustion chamber.

"The first expedient may, in the author's opinion, be ruled out altogether except for purely 'stunt' purposes. All the organic metallic dopes are expensive, poisonous and more or less deleterious to the engine, and the increase in efficiency resulting from their use is more than offset by the cost, danger and trouble which they involve.

"The second expedient is now common practice; all the oil companies now so blend their fuels as to maintain a uniform and fairly high proportion of aromatics and naphthenes, at all events on the European market. Differences, of course, still exist, depending upon the sources of supply available to the different oil companies, but they are nothing like so great as formerly, and compared with seven years ago, a designer may now rely on using a compression at least half a ratio higher, thanks to the improvement in the fuel alone.

"In the author's experience, the widest scope of all lies in the direction of the third expedient, thanks to the greatly increased knowledge of the process of combustion and the application of this knowledge to the design of the combustion chamber.

"As illustrating the wide differences between different shapes of combustion chamber on the same engine under identical conditions, we have found that, referred to our variable-compression engine, the highest useful compression ratios of the various heads tested has ranged from 4.8 to 1 to as high as 6.5 to 1 an extraordinarily wide variation, all the more so considering that none of the heads tested were designed to have a low detonation value. It would have been easy enough to fit a head which would have detonated even below 4 to 1, in fact some of the engines we have had sent to us for test have detonated at considerably more than a whole ratio less than our variable compression engine. It would seem, therefore, that there is far more to be done by studying the shape of the combustion chamber than by any doping of the fuel or other known means with the added advantage that shape costs nothing and is ubiquitous."

This statement is indeed interesting from a successful automotive engineer who has already partially solved the problem of using ordinary fuels in motors of increased compression ratios.

Considering the various factors that have been mentioned, indications are that the motor fuel of tomorrow will be sold largely upon its merits as a motor fuel, that is, upon its performability on an ordinary or typical motor car. High gravity, color, doctor sweet, low end point, odor and similar properties bear practically no relation to the performability of the fuel and because of this will probably disappear from the specifications.

In the light of our present knowledge it seems that the motor fuel giving the best possible performance on motors now in use is the one that has a high partial volatility at low temperatures as indicated by the 8 to 18 per cent range in the A. S. T. M. distillation, a high partial volatility for acceleration and smooth running as indicated by 40 to 75 per cent range on the A. S. T. M. distillation, and a reasonably high dew point to prevent loss in power and increased fuel consumption on motors which supply a large amount of heat to the manifold. Such a fuel must not possess too high a vapor pressure or tendency to cause vapor.

The fuel must possess sufficient anti-knock value to handle satisfactorily the cars in general use whatever their compression ratio may be. It seems, however, that there will not be an increase in demand for higher anti-knock values because the gain obtained in increasing the compression ratio beyond about 6 to 1 becomes relatively less and less, and the difficulty of producing an extremely high anti-knock fuel becomes increasingly greater as the anti-knock value exceeds 45 or 50 benzol. It seems more reasonable to expect that moderately high anti-knock value will become a specification for high grade fuels. With the increasing efficiency of the motor design we should expect to have motors possessing compression ratios as high as 6 to 1 and still using what we may consider to be ordinary gasoline having a benzol value of 25 to 35 based on our present standards. We already have motors of 5.5 compression ratio operating on motor fuel on benzol value of considerably less than this. In fact some tests indicate that such motors can be operated on motor fuels of rather bad knocking properties, even less than what we now consider to be zero benzol value.

In general it seems to me that there must be a balance between the properties of the motor fuel and the requirements of the motor. It is impossible, of course, to strike such a balance until we know accurately the relationship between the motor fuel characteristics and motor performance. A number of laboratories are now working on this subject and we may expect within a few months or at least a few years to have accurate and widely distributed information on this point, so that we will find motor fuel sold on the basis of performability, as indicated by those characteristics which are known to indicate superior motor performance.

Since 1910 . . *for eighteen years* HEIL TANKS have served WADHAMS

THE NEWEST HEIL-WADHAMS TANKER—600 gallon, 4 compartment, semi-elliptical Heil tank with 6 in. filler plugs, ¾ in. full flow vents, adjustable sills, integral can box with side hinged doors, 2 in. piping and hinged bumper mounted on 2-ton Model 56 165 WB White chassis. Note platform for carrying 3 barrels between front end of tank and cab where special 270 gallon auxiliary tank is in place as unit is pictured above.

HEIL Quality Assures "Double Duty" Service

IT is easier to sell Quality gasoline when it is carried to its destination at a filling station, public garage, private garage or industrial plant in a Quality truck tank. Some firms spend much advertising money to talk quality forgetting that quality buying should begin at home and neglecting to consider the advertising value of their tankers and other equipment. Wadhams' policy is to make everything carrying the name Wadhams a quality advertisement for the firm and its products and it is significant, therefore, that Wadhams has been using Heil Tanks for 18 years. There is no question about Heil Quality. It assures "Double Duty" service--advertising and delivering gasoline and oil---to all purchasers of Heil Tankers. It costs no more than any average tank. Let us figure with you now, without obligation on your part, on the new and replacement equipment you will require this year.

1238-50 26th Avenue
MILWAUKEE, WISCONSIN

THE HEIL CO.

Manufacturers of
TANKS, BODIES, HOISTS

The Heil Co. has factory branches at Boston, New York, Philadelphia, Cleveland, Detroit and Chicago with authorized distributors and service stations conveniently located everywhere throughout the United States and in foreign countries. Write for name of distributor nearest you. There is no substitute for Heil Quality.

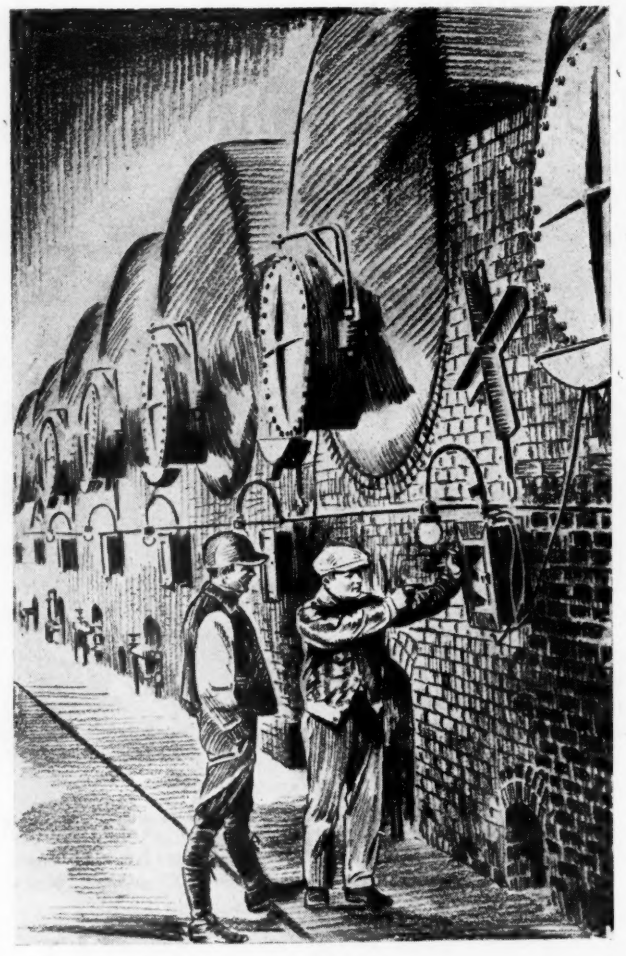
Are You a Judge of Good Oil

?

Can you tell a good oil by its color?

Can you tell a good oil by its feel?

Have you poured out a sample and watched it drip with assumed enlightenment or disapproval dependent upon your notion of how a good oil *should* drip?



Where Quality Starts

When the MARATHON *Stencil goes on a drum, you can depend upon the oil that comes out of it.*

OR DO YOU NOT DEPEND upon the trade brand and the confidence you have in the company that makes it?

Besides this first and important consideration of why the product you sell is good, there is another one of steadily growing importance that is — what does the motoring public know of the brand you sell? Will they be able to recognize quickly that the trade mark identifying the product you sell is one of national import and therefore backed by a company of strength, capacity and obligation to keep trust at all times with the consumer.

MARATHON Products are established products of quality and excellence. They are also products identified by a famous trade mark—appropriate and colorful—that catches the imagination of the motorist and remains in his memory.

This will bring customers to your station and keep them coming back.

TRANSCONTINENTAL OIL CO.

Producers, Refiners and Marketers of Marathon Quality Products

GENERAL OFFICES Tulsa Building TULSA, OKLA.

Division Offices:

Atlanta
Chicago
Fort Worth
Oklahoma City
Little Rock
Sioux City

Refineries:

Boynton
Bristow
Fort Worth

Warehouses at convenient shipping points

White Star Uses Merchandising Plan In Making Price Reduction

Staff Special

DETROIT, Feb. 17

A MERCHANDISING campaign in which a refiner told a straightforward story to the public about economies of operation and sales and in which the dealer was taken back of the scenes in the campaign was used by the White Star Refining Co. in announcing a 2 cent reduction in the price of its premium motor fuel. Net results— a quadrupling of premium gasoline gallonage.

The dealer part of the campaign also was linked with a plan for a house-to-house solicitation for patronage.

Expenditures for the merchandising campaign involved approximately $60,000. Fifteen newspapers throughout Michigan were used in telling the public of refinery improvements and economies of large volume of sales as the cause for the reduction. The campaign was explained to the dealers at local sales meetings, and, to impress the story, White Star Refining gave them a 24 page prospectus explaining the details. The campaign was explained by H. A. Coffin, vice-president in charge of sales, and it was backed by the entire advertising and sales promotion efforts of the company.

To the public there were two newspaper advertising campaigns. The first was from last Sept. 18 to Nov. 1; the second began the day the reduction was effective, Nov. 1. There were eight pieces of copy in the first campaign.

One advertisement, three columns wide by 10 inches deep, told the message, "Quality is Best Controlled at the Source." The copy told advantages of controlling refining operations. Another advertisement of the same size was entitled "Perpetual Motion." The copy told of the journey of crude oil from the well to the station, and at the top was a picture of the skimming stills at the Wood River, Ill., refinery. A third copy, also the same size, recited the story of temperature controls in producing good gasoline with a picture of refinery temperature recording instruments.

Another advertisement, on "The Protection of Science," told of the scientist's part in gasoline production. It was five columns by 12 inches. "Vapors of Value" was the headline on another copy, three columns by 15 inches, on vapors, with a picture of the gas absorption plant at the refinery. "Quality's Silent Sentinels" was the theme of an advertisement four columns by 15 inches with a picture of the refinery temperature and pressure controls.

A SIX-COLUMN by 14-inch advertisement told a short story of the Wood River refinery, accompanied by a bird's-eye view of the plant. Pumps was the subject of another advertisement which explained the importance of this equipment as the heart of a refinery. The advertisement, four columns by 15 inches, had a picture of the refinery pump house.

All these advertisements were pointed to Nov. 1 when the reduction was to be announced. Each piece of copy told of some point of refining which had a bearing on the production of gasoline and also brought in the company's fleet of tank cars. The second series of seven advertisements was on the qualities of Staroline, the premium gasoline that was being reduced 2 cents.

Announcement was made in a full-page advertisement stating that originally Staroline was 7 cents, lately 5 cents and on Nov. 1 was to be 3 cents above competitive gasoline; that the quality was unchanged; and that production economies were being passed on to the public. The second advertisement, three columns by 10 inches, was a duplication of the first, the third copy, four columns by 15 inches, listed seven reasons for superiority of the motor fuel and subordinated the price reduction.

"There's no 'Gum' in Staroline" was the title of the fourth advertisement, containing an extract of a report from E. H. Potthoff, the company's chemical engineer, and also subordinating the price. The copy was three columns by 10 inches. The fifth copy was built around points of Staroline superiority, with some refinery data which led to the reduction. "Bargains in Mileage" was the subject of the sixth advertisement, with price casually mentioned in the copy. The final advertisement of the series, full page size, was on the price change, again followed by an explanation, and the advertisement was headed with a picture of a company tank car.

THE campaign was explained to the dealers at a banquet. To stimulate sales interest awards were offered to salesmen, to divisions, to station operators, to bulk plants for the best record on a percentage basis for

Letter Used by White Star Dealers to Build Up Station Business

FOLLOWING is the letter White Star Refining Co. gave to dealers to use in making house-to-house solicitations for business last November. Dealers were urged to utilize every spare moment in canvassing their communities; the letter to be left with the man of the house and if he was not in to be given to him on his return.

The letter was printed in blue on white paper, 6 by 9 inches. At the top was the five pointed outline star with "Staroline Brand" printing in the middle. Space was left at the bottom for the dealer's stamp and signature. A re-print of the letter follows:

"Dear Sir:

As the manager of a White Star Gas Station in your immediate locality I am interested in your winter requirements of alcohol, greases, motor oils and gasoline.

White Star has, effective November first, reduced the price of Staroline, its premier quality motor fuel, to only 3c more than ordinary gasoline. As you know, this has for years been a 5c premium fuel and now, at the new price, with quality unchanged, it is more than ever the best motor fuel buy in this or any other community.

Attached you will find an interesting pamphlet which discusses Staroline and gives some reasons that I think will appeal to you strongly, as to why you should use it in your car. Won't you take a few minutes to read it?

At our station, we have a complete oiling service. We have air for your tires and alcohol and water for your radiator. We make a practice of wiping windshields and lamp glasses, checking your oil and in every way possible, furnishing you and your family with prompt, courteous and efficient service.

If you are not now using the facilities of our station, won't you please come in and get acquainted with us. I have a neat Oil Change Record there which I would like to give you with my compliments. I think you will find it useful in keeping track of your oil changes.

Sincerely yours,"

Staroline sales over the competitive gasoline grade. To impress on the dealers the details of the campaign they were given a 24-page prospectus and copies of the newspaper advertising campaign.

The prospectus was printed on coated paper, 8½ by 11 inches, with a stiff paper cover; pages were printed on the right-hand side only. There was a list of "Do's" and "Dont's" for White Star men and the conversation was given which the station operator was to use with customers to promote Staroline and oil sales.

A pamphlet was issued by the company to be given to customers which explained under eight headings the reason for the reduction. This pamphlet, 8½ by 10½ inches, was printed in blue and red ink, illustrated with pictures of laboratory equipment for testing gasoline. A card, 4 by 7½ inches, also was given customers, giving advice for winter operation of the automobile.

The campaign was tied up with a plan White Star had worked out to have dealers make personal solicitation for business in their communities. The company provided a form letter of five short paragraphs explaining services at the station and asking the car owner for his patronage. Space was left at the bottom for the dealer's stamp and signature.

All billboards the company was using throughout the marketing territory were used in the campaign and in the company's colors of blue and white announced the reduction and that the quality of the product was unchanged. On Nov. 1, 15-foot banners were put over all stations announcing the reduction.

To Use Movies to Instruct Station Operators

DETROIT, Feb. 17.—In conjunction with its training of service station operators the White Star Refining Co. is planning to use motion pictures to illustrate good and bad practices.

Operators meet every week for an hour or so in the evening to be instructed on points of good station operation and salesmanship. Playlets, with the operators participating, have been used in the past to get across a graphic picture of the point.

Additional training given White Star operators is having a supervisor visit each station daily. There are two men who work full time with the operators in solving local sales problems, spending at times several days at a station. The supervisor, also, will observe a station from a distance for a little while and correct any bad practices.

The company also has each new operator study a manual on salesmanship and on station operations and at intervals the supervisor will quiz him on the manual.

Will These Dealers Give Us Rebate On Coal and Ice We Buy?

Staff Special
CHICAGO, Feb. 17.

SERVICE station operators in Chicago are accustomed to be "mooched" by one kind of club or another whose chief purpose appears to be to "club down" the gasoline price. Club secretaries, casting about for some means of justifying their salaries, seem to come finally to the idea that they can concentrate the purchases of their members and obtain a special price on gasoline.

About a year ago the Union Motor club of Chicago was organized and one of its first official acts was to solicit the filling stations in town to allow club members 2 cents off on gasoline. Later in the year a group of installment collectors organized and soon got the idea that they were a gasoline consumer big enough to "bear the market."

Since then they have come thick and fast. Automobile Associated Trades of Illinois, a group of Chicago filling station owners, has declared openly against them, recognizing coupons from no club that does not redeem them for cash. But 1928 brought a new epidemic of such requests. Under date of Jan. 17, Peter T. Mitchell, secretary of the Illinois Coal Dealers' Association, 160 N. La Salle street, Chicago, broadcast the following letter among Chicago filling stations:

Gentlemen:

"This organization is selecting a limited number of first class gas stations in your district with whom arrangements are to be made for special rates to members of this Association on gasoline, thus providing a mutual benefit to the stations and to the members; the stations will be patronized steadily by all our members, thus doing a greater volume of gas business and gaining the regular profit on oil, etc.

"Our members are the retail coal dealers, movers, ice and expressmen all around you; at present they purchase gas and oil for their trucks and private cars at retail prices any place at all. If your name is placed on the list soon to be distributed among our members, these people will purchase all gas and oil from you exclusively. Other gas stations are operating under a similar plan with motor clubs, business firms, etc. and have found it profitable.

"This Association is organized not for profit and asks for nothing but co-operation and co-ordination. No charge will be made to you for printing or mailing of lists nor for any other expense we may undergo in completing arrangements.

"All we ask is that you promise to give our members a discount of three cents per gallon of gas when they show their membership cards. In return we will announce to the 1500 dealers on our books that you are a friend of the organization who has pledged his co-operation as explained above. Kindly let us have your opinion on this matter as soon as possible."

Yours for Co-operation,

Illinois Retail Coal Dealers' Association

It is said the filling station men doubted Mr. Mitchell's ability to deliver the patronage of his members which he so glibly assured. Moreover, they generally considered 3 cents a gallon too much to pay for the coal jobbers' business. F. H. Avery, president of the A. A. T. I. is collecting an album of the prize letters written to Mr. Mitchell. One Chicago filling station man replied as follows the next day:

Illinois Retail Coal Dealers' Association,
160 N. LaSalle St.,
Chicago, Illinois.

Attention Peter T. Mitchell.

Dear Sir:

"Your letter of the 17th inst. received and the contents carefully gone over.

"It has always been our policy to steer clear of the so-called benefits received from motor clubs and associations whose members hold cards entitling them to our legitimate profits. At this particular time we are not considering a change in these policies.

"Your letter does not state that we are entitled to a reduction of three dollars per ton on the coal we buy in return for the allowance we would be called upon to make on gasoline sold to the coal dealers. We feel that 'what is sauce for the goose is sauce for the gander.'

"Your wide knowledge of business affairs will readily point out to you that if we were to honor all the discount cards presented at our station being issued by the multitude of clubs we would soon be able to close up shop, and as it is necessary to render the same service to all comers it is just as necessary that our profits should cover this service. No doubt your association has done a lot to bring about a legitimate profit to the coal dealers.

Yours very truly,
Signed
Jack R. Bailey.

INTEREST YOU!

Many a Motorist Spends a Dollar for Service When He Really Thinks He is Buying Gasoline

GOOD gasoline gives him service in mileage after he leaves your station. But the service that costs him the least is the service that expresses itself in a regard for his time —for his wish to be on his way; in a regard for his convenience—for his confidence and his feeling of pride in his car. It is this service that makes the difference between a 75 cent dollar, a 90 cent dollar and a 100 cent dollar. It is this service that wins customers, that keeps them coming back, that makes stations pay.

Gasoline dispensing equipment is taking on added responsibilities. It is the means of meeting service demands. And now you will be looking for features that improve service. Erie Meter Systems cut refueling time to seconds. Continuous flow method of dispensing gasoline at the rate of 20 gallons a minute gets customers on their way; increases your capacity for rush hour business; invites slack hour business and suggests a bigger purchase because the Erie Meter System is not a five or ten gallon pump. There is nothing more accurate and safe than nozzle control. With the attendant right at the tank he can dispense any quantity the tank will hold without the liability of overflowing. Your customers get clean, courteous service and the precision construction of Erie Meters insures accurate measure.

To a good location and good gasoline, add the commanding appearance of an Erie Meter System. It is a symbol and a pledge of a full dollars' worth of service. Record sales of users are proving the gallonage and patronage boosting ability of Erie Meter Systems. Well over a million motorists are now served by 15,000 Erie Meter Systems. There will be more cars driven in 1928 and they will be in a hurry all the time. Will they stop at your stations? Mail the coupon now.

ERIE METER SYSTEMS, INC. · *506 East 10th Street, Erie, Pa.*

The Erie Representative is a good man to know. His experience developed from actual contact with the problems of many oil marketers in different parts of the country can be of practical benefit to you. His services are available in helping you to meet the problems of your business.

Mechanical Advantages of Erie Meter Systems, No. 1

Only one discharge line is necessary in the installation of Erie Meter Systems compared with the two discharge lines necessary with the ordinary crank or visible type of pump. This important mechanical advantage of Erie Meters effects a decided saving in installation costs in addition to speeding up the installation job.

Further Mechanical Advantages of Erie Meter Systems will appear in future advertisements. Watch for them.

METER SYSTEMS

ERIE METER SYSTEMS, INC.
506 East 10th Street · · Erie, Pa.

I want to know how I can increase gallonage, make more profits and attract steady customers. Send me complete information and prices on the Erie Meter System.

Name .....

Company .....

Address .....

City ..... *State* .....

© 1928—Erie Meter Systems, Inc.

Our Industry — A Page of Facts and Personalities

National Petroleum News

By Paul Wagner

CHARLES STARYSKY of Marysville, Texas, writes that he has been allowed U. S. Patents Nos. 41,735 and 160,990 for a unit that permits pumping of oil wells without rods and tubing. The unit, he says, is lowered, anchored, pumped and withdrawn by means of one cable, which leaves the hole clear of all obstructions. The unit is equipped with automatic lock packer, which is a separate invention that may be used where packer is needed.

* * *

FLOYD MILLER, formerly identified with geological work in New Mexico for Marland Oil Co. of Colorado, is now with the Reiter-Foster Oil Corp., with Tulsa headquarters.

* * *

W. M. VANDIVERT has been transferred from the Chicago offices of the Pure Oil Co., to Fort Worth, where he will have charge of the materials division of the southwestern producing organization. E. J. Fox, transferred from Fort Worth to Mexia, will have charge of similar work in the fault line fields of east central Texas. Harry W. Bell of Chicago, general office materials department manager, has returned to Chicago after an inspection trip in Texas.

* * *

ASON, T. R. Jr., recently arrived at the home of Mr. and Mrs. T. R. Monk of the general office purchasing department of the Louisiana Oil Refining Corp., Shreveport.

* * *

DILWORTH S. HAGER, who recently announced his resignation as chief geologist of the Vacuum Oil Co., at Houston, will engage in the oil business in Texas on his own account, after March 1. Details of his plans have not been made public. Mr. Hager had charge of geological work in east and southwest Texas for the Gulf Production Co., before becoming identified with the Vacuum organization several years ago. His higher education was gained at Washington University, St. Louis, three years, and Harvard University, three years. Both his S. B. and A. M. degrees are from Harvard. He was born in St. Paul, Minn., Dec. 24, 1888.

* * *

H. R. KELLAR of the Cooper Petroleum Co., Houston marketers, is back on the job again regularly after an illness that confined him to his bed for several weeks.

WOODALL RODGERS

WOODALL RODGERS, member of the Dallas firm of Turner & Rodgers, is the legal representative in Texas of the Dixie Oil Co., Inc., direct producing subsidiary in the southwest of the Standard Oil Co. of Indiana. Rodgers devotes a large part of his time to petroleum industry affairs and may be found regularly attending the luncheons of the "wildcat committees" of the Mid-Continent Oil & Gas Association at Dallas and Fort Worth. He is a member of the Dallas committee. The accompanying snapshot was taken on the golf links at Fort Worth, where Mr. Rodgers was attending a recent meeting of oil men.

* * *

FRANK B. DUNLAP, office assistant at Electra under Superintendent E. N. Williams, has been transferred to the Pampa, Texas office of Magnolia Petroleum Co., assisting Superintendent A. G. Post.

* * *

WALTER G. TSCHUDIN of the Sinclair Mexican interests was elected 1928 president of the American School Association at Tampico at a meeting held late in January.

* * *

E. P. ANGUS is acting general sales manager of the Magnolia Petroleum Co., Dallas, for the period of a year's leave of absence granted A. C. Ebie because of ill health. Mr. Ebie retains his position as director and vice president of the Magnolia.

DR. W. A. J. M. VAN WATERSCHOOT VAN DER GRACHT, retiring research vice president of Marland Oil Co. of Delaware, Ponca City, plans an extended trip to Europe.

* * *

E. H. DEVORE, geologist and mining engineer, who now lives at El Paso, has made location for an oil test to be drilled by himself and associates in sec. 214, H&TC block 34, Ward county, Texas. Mr. Devore, whose attention has been largely devoted to hard mining activities in northern Mexico for several years, was widely known for his petroleum industry work at Shreveport, Tulsa and Fort Worth before and during Ranger development days.

* * *

T. J. DONOGHUE, vice president of The Texas Co., at Houston, and L. E. Barrows, division production executive at Fort Worth, have returned to their respective headquarters after a survey of west Texas operations.

* * *

SIX veterans of Standard Oil Co. of California service were recently presented pins by President K. R. Kingsbury in recognition of their having been identified continuously with that corporation's activities for 30 years. Mr. Kingsbury was himself one of the number. Others were J. J. Wilt of the pipeline department, Bakersfield; W. B. Cookson, San Francisco agency; H. V. Vidal, Richmond refinery; Marshall Reed, Los Angeles agency; and C. O. Muchow, San Francisco agency.

* * *

A. B. PATTERSON, Rocky Mountain general superintendent of the Texas Production Co., is recovering from a stomach ailment which recently caused him to undergo an operation at Rochester, Minn. Before going to Denver to make his headquarters several years ago, Mr. Patterson was Gulf Coastal general superintendent at Houston for The Texas Co.

* * *

AN OKLAHOMA correspondent whose company made too heavy an operating investment in the Amarillo district to allow his name to be used in this connection contributes the following succinct observation:

"The Texas Panhandle, which was once known as 'the land of magnificent distances', is now described as 'the land of magnificent deficits'."

* * *

W. C. ADAMS, San Angelo district superintendent of the Pittsburgh Oil & Development Co., has resigned to engage in individual operations. Before going to west Texas three years ago he had been in foreign service in Mexico and South America.

International Ambassadors of Performance

HUGHES TOOLS

During the period between Jan. 1st and 31st. Shipments of Hughes Tools were made to practically every oil field of the world where rotary tools are used

HUGHES TOOL COMPANY

Service Plants
Los Angeles, Calif.
Oklahoma City, Okla.

Main Office and Plant
HOUSTON, TEXAS

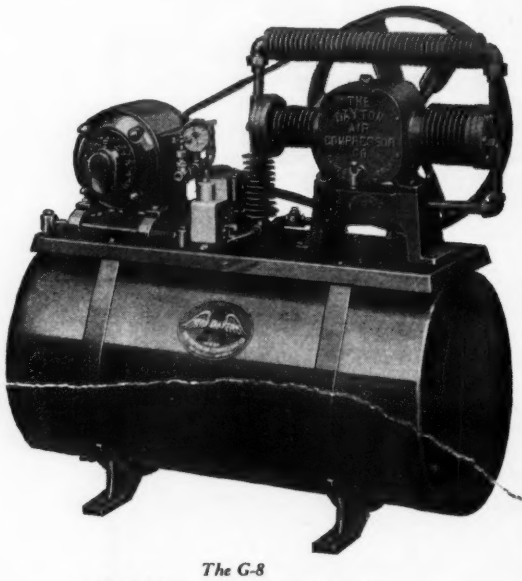
Export Office
Woolworth Bldg.
New York City

HOW HARD MUST YOUR COMPRESSOR WORK?

IF we knew just what you expect of your air Compressor, we could tell you at once just the type and capacity to do that work, without waste and without strain. Don't buy a Compressor too big or too small—in either case there is liable to be dissatisfaction.

Buy a Dayton of the right size and avoid trouble and repair bills.

Dayton style "G" Compressors are made in 7 sizes, with capacity varying from 2¼ cubic feet per minute up to 9¼ ft. A size to meet any and every requirement.



The G-8
2 H. P. Motor *Capacity 9½ cubic*
60 gal. Tank *feet per minute*

ALL DAYTON "G" COMPRESSORS

In fact—All Two-Stage Compressors built by us—contain no connecting rod, crosshead pin, cotter pins or bolts.

This means fewer parts and less repair work.

If you are in doubt as to capacity you need, write our Engineering Department. Ask any questions and submit any problems. They will help you to decide to your advantage.

THE LUCAS PUMP & TOOL COMPANY DAYTON, OHIO.

DAYTON AIR COMPRESSORS

425 Valley St. **Dayton, Ohio, U.S.A.**

Treating Plants

M. W. KELLOGG CO.
7 Dey Street ~ New York

Kansas City, Mo. . . . . 700 Baltimore Ave.
San Francisco, Cal. . . . . 444 Market St.
Los Angeles, Cal. . . . 329 Petroleum Sec. Bldg.

New Patents

Jan. 24

REFINING

Process of Refining Oils—Alfred Schwarz, Montclair, N. J., assignor to Petroleum Sand Products Corporation. Filed June 14, 1924. No. 1,656,990.

Process of Refining Oil—John C. Black, Los Angeles, Calif. Filed April 5, 1920. No. 1,656,997.

Straight-Tube Fuel-Oil Heater—Eric H. Nelson, Massillon, Ohio, assignor to The Griscom-Russell Company, New York, N. Y. Filed May 14, 1925. No. 1,657,027.

Fuel-Oil Heater—Eric Hugo Nelson, Massillon, Ohio, assignor to The Griscom-Russell Company, New York, N. Y. Filed June 30, 1926. No. 1,657,028.

PRODUCTION

Pumping-Derrick Reenforcing—Troy Almond Leonard Bowen, Tulsa, Okla. Filed March 27, 1926. No. 1,656,900.

Screen Pipe with Slots Disposed in Circular Areas—Joseph Henry McEvoy, Jr., Houston, Tex. Filed May 19, 1926. No. 1,657,130.

Combined Tubing Bleeder, Valve, and Trap—William H. McKissick, Tulsa, Okla. Filed April 13, 1927. No. 1,657,131.

Counterbalance for Walking-Beam Pumping Rigs—William Clarkson, Jr., Corsicana, Tex. Filed Dec. 6, 1926. No. 1,657,150.

Beam Bearing for Deep-Well Pumps—James P. Ratigan, Los Angeles, Calif. Filed May 3, 1926. No. 1,657,178.

NATURAL GAS

Natural-Gas-Dilution System—Harry F. Smith, Dayton, Ohio, assignor to The Gas Research Company, Dayton, Ohio. Filed April 27, 1922. No. 1,657,045.

MISCELLANEOUS

Crank-Case-Oil Heater—Clarence M. Corlew and George A. Bloh, Sioux Falls, S. Dak. Filed May 6, 1926. No. 1,657,151.

Process of Hydrolysis Particularly the Splitting of Oils and Fats—Percival John Fryer, Kent, England, assignor to Catalpo Limited, London, England. Filed April 9, 1921. No. 1,657,440.

Jan. 31

REFINING

Process and Apparatus for Treating Hydrocarbon Oils—Hiram W. Camp, Tulsa, Okla., assignor to Doherty Research Company, New York, N. Y. Filed Nov. 29, 1922. No. 1,657,524.

Method of Distilling Hydrocarbons and Fuel Produced Thereby—Lindell T. Bates, Mount Lebanon, N. Y. Filed June 5, 1926. No. 1,657,815.

PRODUCTION

Multiple-Cutter-Disk Bit—Ivan C. Bell, Cameron, Tex., assignor to The Guiberson Corporation, Dallas, Tex. Filed Nov. 12, 1924. No. 1,657,604.

Multiple-Cutter-Disk Bit—Ivan C. Bell, Cameron, Tex., assignor to The Guiberson Corporation, Dallas, Tex. Filed Jan. 5, 1925. No. 1,657,605.

Multiple-Cutter-Disk Bit—Ivan C. Bell, Cameron, Tex., assignor to The Guiberson Corp., Dallas, Tex. Filed Jan. 5, 1925. No. 1,657,606.

Well-Drilling Bit—Charles S. Crickmer, Dallas Tex., assignor to The Guiberson Corporation, Dallas, Tex. Filed June 9, 1925. No. 1,657,607.

Well-Drilling Bit—Charles S. Crickmer, Dallas, Tex., assignor to The Guiberson Corporation, Dallas, Tex. Filed Sept. 14, 1925. No. 1,657,608.

Axle for Multiple-Drill-Disk Bits—Charles S. Crickmer, Dallas, Tex., assignor to The Guiberson Corporation, Dallas, Tex. Filed Oct. 21 1925. No. 1,657,609.

Multiple-Disk Drill Bit—Charles S. Crickmer, and Ivan C. Bell, Dallas, Tex., assignors to The Guiberson Corporation, Dallas, Tex. Filed Oct. 21, 1925. No. 1,657,610.

MISCELLANEOUS

Method of Deodorizing Isopropyl Alcohol—Claude S. Hudson, Trenton, N. J., assignor to Standard Development Company. Filed June 28, 1921. No. 1,657,505.

A·M·L·O

Announcing A NEW DISCOVERY

A Pure Paraffin Base Oil . . . Free Flowing in Both Zero and Summer Weather

A NEW lubricating oil is on the market. It is the original and only pure paraffin base oil developed to meet the specific summer and winter needs of aircraft motors. This new oil is . . . A-M-L-O . . .

All Weather Is Alike to AMLO

Lubricating engineers, motor experts and the layman have long recognized the many exclusive advantages of a Pure Paraffin Base lubricating oil; and also its one stumbling block . . . cold weather. Cold weather makes the wax in the oil tend to congeal and thus hinders perfect lubrication.

AMLO has every particle of wax removed. It is the first and only pure Paraffin Base lubricating oil to be made 100% wax-free in commercial quantities, which gives it better fluidity at low temperatures than any other oil.

Authorities recommend AMLO for use in both *zero* and *summer* weather.

The development of this wax-free oil is the result of scientific study and development, and the invention of utterly new processes. It has been subjected to and passed every test, and meets or exceeds every required specification.

A-M-L-O is from the world-famous Ranger Pure Paraffin Base Crude oil supplied by our own wells . . . gathered in our exclusive pipe line system and refined in our Fort Worth refinery. From well to you, uncontaminated.

33 1/3% More Flying Hours

One result of A-M-L-O is 33 1/3% more flying hours of perfect lubrication . . . in *all* weather, without changing oil. If A-M-L-O is not yet available in your territory, write direct to the Company.

COPYRIGHT 1928

AMLO OILS

STOCK NO.	U. S. GOVT. GR. NO.	VIS. @ 210	FLASH	FIRE	COLD TEST	CARBON	ACIDITY	EMULSION	PRECIP. NO.
840	—	60-65	420-430	485-495	10 Max.	.75% Max.	.01-.05	O. K.	0
850	1	75-85	430-440	490-500	10 Max.	1.5% Max.	.01-.05	O. K.	0
860	2 & 3	90-100	460-470	530-540	10 Max.	1.5% Max.	.05-.1	O. K.	0
870	4	115-125	480-490	560-570	5 Max.	2.0% Max.	.05-.1	O. K.	0

TEXAS PACIFIC COAL AND OIL COMPANY

FORT WORTH, TEXAS

TRIPLEXD
GASOLINE HOSE

All sizes and lengths of Triplexd Hose are carried in stock in these cities:

MEMPHIS: 245 Monroe Ave.
JACKSONVILLE:
Dixie Culvert & Metal Co.
ATLANTA: P. O. Box 1343
RICHMOND: P. O. Box 514
BROOKLYN: 236 Tillary St.
BOSTON: 142 Berkeley St.
PITTSBURGH:
341 Second Avenue
CLEVELAND:
4336 Broadway
CINCINNATI:
450 East Pearl Street
DETROIT:
5459 Grand River Avenue
ST. LOUIS:
1621 Pine Street
KANSAS CITY:
13th Street and Eastern Ave.
CHICAGO:
1213 W. Washington Blvd.
SAN ANTONIO:
1401 South Flores Street
HOUSTON:
700 N. San Jacinto Street
EL PASO:
1020 East Overland Street
WICHITA FALLS:
P. O. Box 1327
NEW ORLEANS:
211 South Peters Street
MINNEAPOLIS:
900 Sixth Ave., S. E.
DENVER: 4800 York Street
SAN FRANCISCO:
873 Mills Building
LOS ANGELES:
1625 South Hill Street
SEATTLE: 67 Columbia St.
OMAHA: 13th & Willis Sts.
TORONTO, CAN.: Dunlop Tire & Rubber Goods Company, Limited
LONDON, ENG.:
J. Bazley-White, 3 Love Lane, Eastcheap, E. C. 3

METAL HOSE & TUBING CO.
INCORPORATED
236 Tillary Street
BROOKLYN, N.Y.

New Equipment to Improve Plants

Personal Notes of the Manufacturers

National Petroleum News

Lewis-Shepard Co., 154 Walnut St., Watertown station, Boston, announces the new single lift truck Type R to be known as "180". The truck offers a lifting radius of 180 degrees.

Other recent announcements by Lewis-Shepard Co. are that all electric power stackers carrying the cable control as standard equipment with no increase in price. The "decelerator" now is standard on all hand power equipment and at no increase in price.

* * *

Burndy Engineering Co., 10 E. 43d St., New York, announces that it has been appointed as distributor for Everdur by the American Brass Co. Everdur is a new alloy of copper, silicon and manganese for which Burndy Engineering claims that the tensile strength of the bar when rolled approaches 100,000 pounds per square inch and a fatigue of 200,000,000 cycles at a tension of 25,000 pounds per square inch, plus and minus. Burndy Engineering is stocking the material in basic forms and in castings and forgings.

* * *

A new line of screw jacks is announced by Templeton, Kenly & Co., Ltd., of Chicago, manufacturers of the Simplex jacks. Instead of the solid frame, Simplex screw jacks are built with an open handhole, permitting the screw of the jack to be visible at all times. This informs the operator how high the screw may be run out. The carrying handle is a portion of the handhole, being braced and ribbed. The screw and head are forged from one piece of steel. The standard and cap are made of refined gray iron. The base is formed with an extra ribbing.

Thirty-two sizes will comprise the line. Included in these sizes will be one special size, known as a Junior jack, for farm, house, garage and shop use.

* * *

Five demonstrations of the Phomene Accumulator System of fire fighting were given Jan. 19. One of these was of an oil fire in a tank 30 feet in diameter charged with 18 barrels of light distillate and two barrels of high-test gasoline. The fire, covering 706 square feet, burned three minutes before foam was applied, and flames were 50 to 70 feet long. Foam from the Phomene generator flowed for one minute when the water line of the Phomene accumulator was opened and 46 seconds later the fire was out. From 440 pounds of Phomene foam making powder 3,900 gallons of foam were produced. The system was developed by the Pyrene Manufacturing Co., Newark; the Globe Automatic Sprinkler Co., Philadelphia; and the Minimax Co. of Germany.

* * *

Champion Pneumatic Machinery Co., 8164 S. Chicago Ave., Chicago, has off the press a bulletin on the new Champion vertical single two and four cylinder compressors which are designed to take care of the demand for large quantities of high pressure air for greasing at large or super-service stations. Demand for air requirements larger than the usual type of compressor, has necessitated the building of these units, the company states. Specifications, equipment of compressors and other pertinent data, are furnished in the bulletin.

* * *

National Flue Cleaner Co., Inc., Groveville, N. J., has published a bulletin on its soot blowers designed only for use with horizontal return tubular and Scotch marine boilers. These devices employ a separate nozzle in a fixed position for each boiler tube, making it impossible for any tube to escape the scouring action of the steam jet. The soot blowers can be operated with steam or compressed air without interfering with the steaming of the boiler.

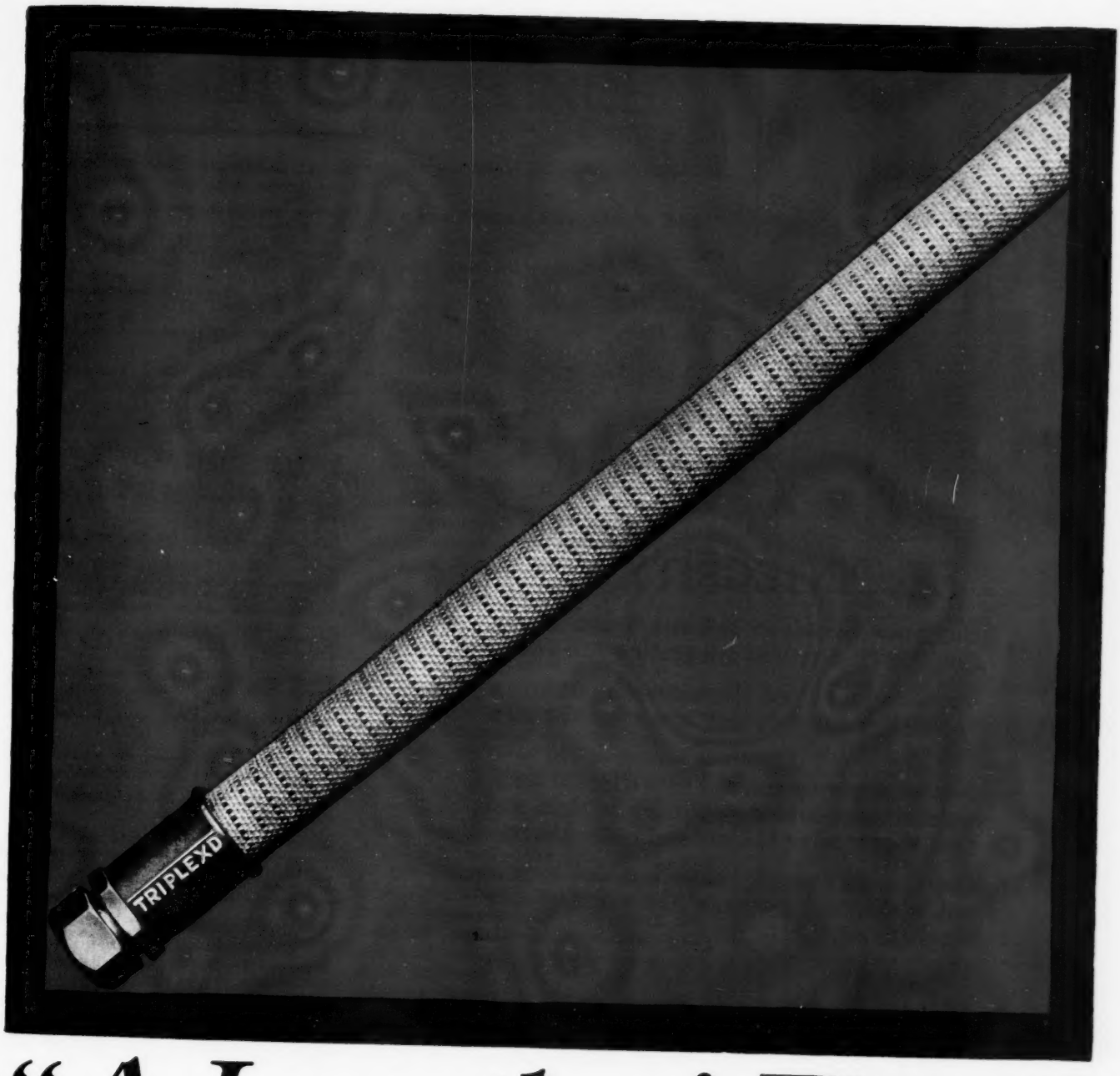
* * *

Allen-Bradley Co., Milwaukee, Wis., maker of electric controlling apparatus, has published a bulletin on its type J-3052 automatic graphite compression resistance starter, in which the resistance can be steplessly adjusted to meet any motor load condition, thereby providing the motor with a start which is right for existing conditions. The driven machine can also be brought up to speed without a jar or jerk, reducing wear and tear on the apparatus.

* * *

Quigley Furnace Specialties Co., 26 Cortland St., New York City, has developed the Quigley bitumen gun with which applications of bituminous products as protective coatings to foundations, walls, roofs, pipe lines, etc., can be made. With this gun two men can do as much work as 12 with mop or brush, the company claims.

Hot tar, asphalt, pitches, waxes, enamels and similar fluids can be applied with the gun. It is enclosed in a steel housing and has a capacity of 15 gallons. It can be easily cleaned with compressed hot air.



"A Length of Time"

IF YOU specify Triplexd Hose you pay for a "length of hose" but you get a "length of time". Because—

You are now insured for 1000 Days against losses from ordinary wear and tear, accidental breakage, and mishandling in the operation of every pump you own, to which Triplexd Registered Insured Gasoline Hose* is attached.

Write for full details.

METAL HOSE & TUBING CO.
INCORPORATED
236 Tillary Street
BROOKLYN, N.Y.

Triplexd Registered Insured Gasoline Hose is any length of Triplexd Filling Station Pump Hose ¾", 1", or 1¼" inside diameter, and not more than 15 feet long, shipped from our Brooklyn Factory on or after June 1, 1927

"DEFIANCE"

INTEGRITY

Buy your barrels at as low a figure as you can, but be sure you are getting full value.

Specifications cover the materials put into a barrel but they do not apply to the men behind the barrel.

Almost anybody can roll up a sheet of steel, weld it together, stamp their initials and the gauge steel on the end and call it a barrel.

But it takes integrity as well as skill to turn out a shipping package like the Defiance Steel Barrel.

You get your money's worth in a Defiance Steel Barrel.

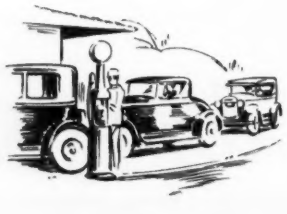
THE AMERICAN STEEL PACKAGE CO.

Defiance, Ohio

Increase Club, Lodge and Factory Business

ALLISON COUPON BOOKS

Accurate—Compact—Convenient



Clubs and similar organizations like the convenience of making their purchases on a coupon basis. Get their business for YOUR filling stations with Allison Coupon Books. Furnished in stock or special designs. Absolutely accurate. Send for samples and prices.

Allison Coupon Company

Indianapolis, Indiana

Coupon Book Specialists Since 1888

New Stations Building

Newton, Kan.—Golden Rule Oil Co. is completing garage and filling station.

Quanah, Tex.—J. E. Woolbright plans to build filling station.

Wymore, Neb.—John Hahenstein and Fred Sohn will build filling station.

Urbana, O.—Louisiana Oil Refining Corp. will erect filling station.

Dover, O.—Roxana Petroleum Corp. will build filling station.

Columbus, O.—Cary Oil & Lubricating Co. leased property for filling station.

Hillsboro, O.—J. E. Smith Oil Co., Washington C. H., will build filling station.

Toledo, O.—Standard Oil Co. of Ohio will erect filling station.

Sandusky, O.—Curtis Oil Co. seeks permit for filling station.

London, O.—London Oil Co. will build filling station.

Dubuque, Ia.—Molo Oil Co., a new oil company and subsidiary of Linehan & Molo, plans to build several service stations here.

Dubuque, Ia.—Rainbo Oil Co. will build filling station.

Woodstock, Ill.—Collins & Smith, Rockford, Ill., will build filling station here.

Russellville, Ark.—Jim Rose is completing filling station.

Charleston, Ark.—Bread Oil Co., of Fort Smith, is completing filling station.

Garden City, Kan.—Hi Richardson is completing filling station.

Sioux City, Ia.—Star Oil Co. and Alexander Jackson each will erect a filling station.

Alexandria, La.—Pierce Oil Corp. is completing filling station.

Athens, Tex.—Beatty Jones is building filling station.

Bellevue, Ia.—Dr. M. W. Moulton will build filling station.

Columbus, O.—Russell B. Clark Co., tire distributor, leased property for service station.

Wooster, O.—Roxana Petroleum Corp. plans to build bulk station here.

Bellaire, O.—Baltimore & Ohio R. R. is building filling station at Kirkwood.

Wilmington, N. C.—J. L. Cruse will build filling station.

Union, N. J.—Mrs. Rose Rispoli will build filling station.

Passaic, N. J.—Gulf Refining Co. will build filling station.

Ayrshire, Ia.—Ralph Cushion will build filling station.

Greeley, Neb.—Tom Faherty and John Goonan will erect filling station.

Darlington, Wis.—Cuba Oil Co. will erect filling station.

Lancaster, Wis.—Standard Oil Co. of Indiana will erect filling station.

Neenah, Wis.—Roy Stroemer plans to build filling station.

Utica, N. Y.—Traffic Oil Co. will build filling station.

Mamaroneck, N. Y.—Morris Stern will build filling station.

Great Bend, Kan.—Sinclair Refining Co. will build filling station.

Pine Bluff, Ark.—Pennant Filling Station will build filling station.

ON THE LAZY BENCH

National Petroleum News

Probably Safety First

He (to the girl seated at the other side of the room)—"What would you say if I were to throw you a kiss?"

She—"I'd say you were the laziest man I ever met."

—*Magnolia Oil News.*

* * *

"How is it," said the teacher to the new pupil "that your name is Green and your mother's name is given as Smith?"

"Well, you see," explained the pupil, "she got married again but I didn't."

—*Our Sun.*

* * *

A New York actress was giving a benefit performance at Sing Sing. "Stone walls do not a prison make, nor iron bars a cage," she thrilled.

From the back of the room a deep voice ejected, "But, lady, how they do help."

—*Skelly News.*

* * *

Yes, He Had

Landlady—"I think you had better board elsewhere."

Boarder—"Yes, I often had."

Landlady—"Often had what?"

Boarder—"Had better board elsewhere."

—*Magnolia Oil News.*

* * *

Her dad—"Understand, young sir, that my daughter should not be tied to an idiot all her life."

Her suitor—"That's right, sir All the more reason why I should take her off your hands."

—*Our Sun.*

* * *

Workmen formed an archway of picks at a roadmender's wedding. The bridegroom was rather nervous, fearing a whistle might sound at a critical moment.

—*Skelly News.*

* * *

Very Good Reason

Doctor (examining a negro, very much under the influence of liquor): "Why, this man's been drugged!"

Mose: "Yas, suh, I knows it. I drugged him all de way from de saloon."

—*Magnolia Oil News.*

* * *

"I want you to make me the outfit for my trial."

"Let me see," mused the experienced modiste. "You'll want a direct-testimony suit, a cross-examination gown, and something dainty and clinging to faint in."

—*Skelly News.*

Where There's Life There's Soap

He: "You are a little Fairy, may I hold your Palmolive?"

She: "Not on your Lifebuoy, your head's solid Ivory."

He: "This is where I get the Colgate."

She: "I Woodbury that joke if I were you."

—*Magnolia Oil News.*

* * *

Mart Kippel stopped to change tires in a desolate region in the far west.

"I suppose," he remarked to a native onlooker, "that even in these parts of the country the bare necessities of life have risen tremendously in price."

"You're right, stranger," replied the native gloomily, "and it ain't worth drinking when you get it."

—*Skelly News.*

* * *

The triumphant return of the "little town boy" who has made good in the big city isn't always what it should be.

"There's a story on record of one whom we shall call Bill Jenkins. Now Bill had done just that—gone to the big town 20 years before, and made good—with a vengeance. So when, after these 20 long years, Bill alighted at the little station platform of the old home town, he had high hopes of making a big impression on the local talent. But there wasn't a person in sight he knew—not a soul.

Disappointed, he sought out the baggage master, a friend since boyhood. Here was one at least who would welcome him, and he was properly impressed. He was about to extend a hearty greeting, when the baggage master spoke first:

"Hello, Bill," he said, "Goin' away?"

—*Magnolia Oil News.*

* * *

Motorist in the chair: "Yank that molar out, Doc."

Dentist: "Will you have gas?"

Motorist: "Yeah, an' you might look at the oil, too."

—*Skelly News.*

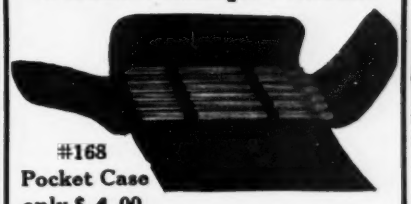
* * *

Dora: "What a beautiful new gown Helen is wearing. Is it imported?"

Marie: "It's her last season's dress; the dressmaker turned it inside out, and now Helen calls it her dress 'from the other side.'"

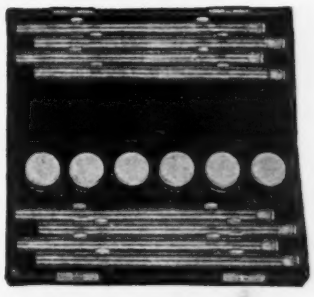
—*Magnolia Oil News.*

Pocket Sample Cases



#168 Pocket Case only $4.00

Sturdily constructed from black cobra grain cowhide. Lined with red plush. Contains six bottles. 9"x5½".



175—This case contains eight 9-inch bottles and six grease jars. Made from black cobra grain cowhide, lined with red plush. Has two serviceable nickel slide catches. Price including metal capped corks, only ---------- $7.00

Less 10% for Cash
Other styles in our FREE Catalog

L-U-C-E

Builders of Sales Luggage
614 Delaware Kansas City, Mo.

"S. O. S."

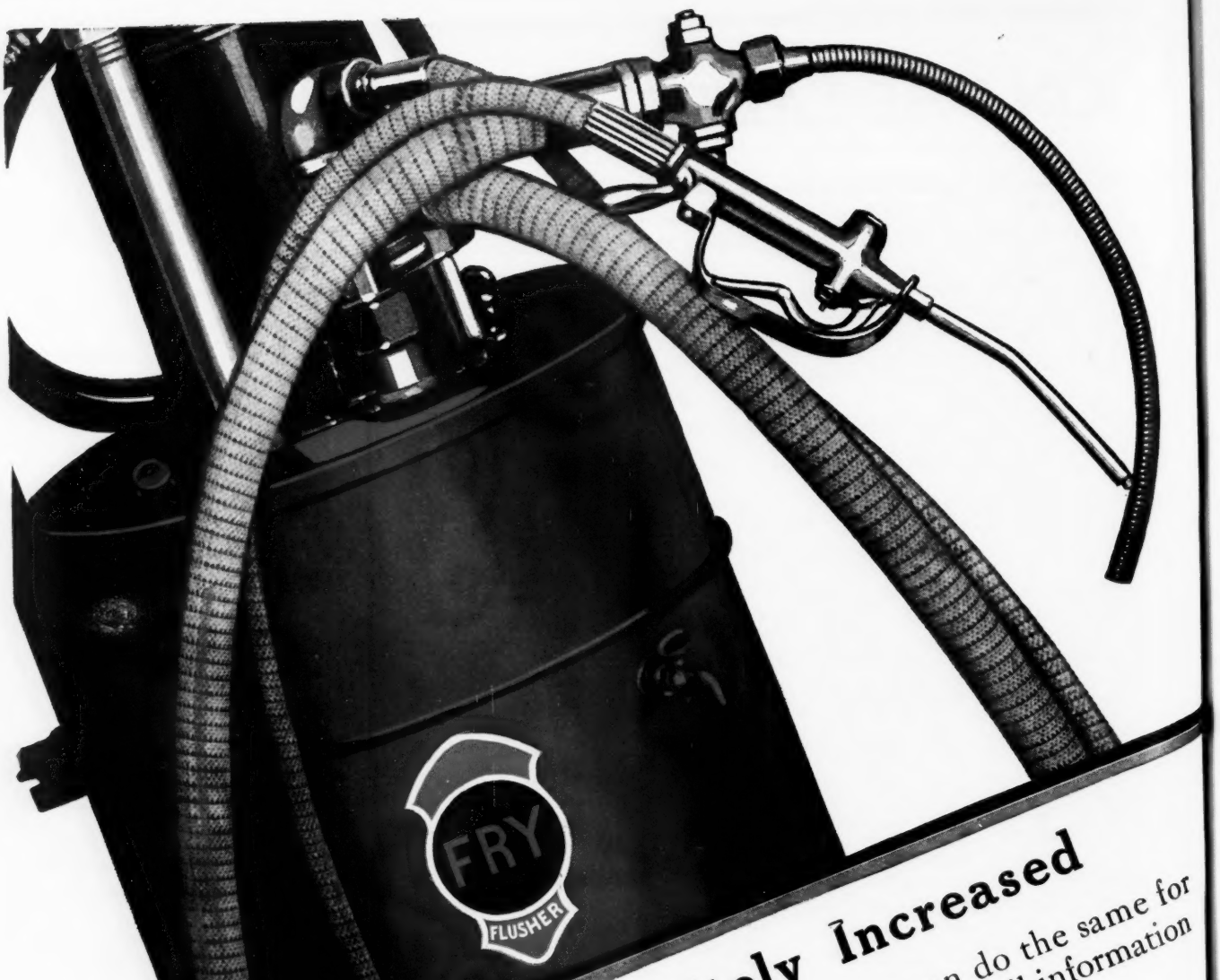
HELP TO

MAKE ONLY THE BEST MOTOR OILS IS WHAT WE ARE GIVING YOU.

Processed Vegetable Castor Oil 100% Pure.
Castor Essence.
Castor Base.

Mix them with any motor oil. They will not separate or gum.

Seymour-Howard Corp.
Manufacturing Chemists
601 W. 53rd St. Chicago



Grease Sales Definitely Increased

That's precisely what the Fry Flusher does. That and nothing else. It increases grease sales. It gets you new customers. It makes motorists form the habit of returning to your service station *regularly* to regrease *regularly*. Fry Flushers have increased grease sales from 100% to 5000%. Get that please.

The Fry Flusher can do the same for you. Write today for full information on this great profit producer.

A big National Fry Flusher advertising program starts in the March 17th Saturday Evening Post. This Spring drive will sell millions of extra pounds of grease! Get ready.

FRY EQUIPMENT CORPORATION, ROCHESTER, PA

FRY EQUIPMENT COMPANY OF CANADA, LTD., TORONTO, CANADA

Refinery - Tank Wagon Markets

National Petroleum News

Fuel Oil Prices Advance, Domestic Gasoline Demand Better

Staff Special
TULSA, Feb. 18

THE Mid-Continent refinery market this week entered the second half of the month under conditions as favorable as at any time this year. The demand for all products was fair with the possible exception of the burning and heating oils, and contracts were taking these commodities out in sufficient quantity to prevent any surplus goods being offered.

The reduction in lower grades of Mid-Continent crude oil by the Magnolia Petroleum Co. on Feb. 16 came too late in the week for any reflection on the refined market the cut might eventually have.

Opinions as to the cause of the cut were numerous. Some expressed the view that the cut was made to tie in some way with the west Texas crude oil situation. It was pointed out that the gravity of the oil in that area is about the same as the gravity of the oil reduced in the Mid-Continent.

Others declared that the cut was an economic attempt to create a wider differential between the low gravity oils which were not in good demand and the higher gravity oils which are reported somewhat scarcer. Instead of creating a wider differential by raising the price of the higher gravity oils, as has been the case on numerous occasions in the past, the higher gravity oil prices were not disturbed while the low gravity oils were materially reduced in prices. The reduction by the Magnolia ranged from 13 to 30 cents a barrel on oils from 31-31.9 gravity down.

Fuel oils probably were in most active demand in Oklahoma. This was especially true of the lower gravities. Refiners making the 14-16, 16-18, 18-22 and 22-26 gravity oils report almost without exception that they are sold up for the month. While some attention still is being paid to the cold test of these oils, the demand apparently has been good since the first of the month, regardless of the cold test.

Prices on these grades of fuel accordingly have moved up during the week from 2.50 to 7.50 cents a barrel. One buyer yesterday declared that he almost had to beg his refiner connections for the 14-16 and 16-18 fuel oil the past few days. Another large buyer who combed the field early in the month for 18-22 and 22-26 gravity oils, buying as much as possible for over the month shipment, said today that he was having some difficulty getting car numbers and he found several refiners considerably behind with fuel oil shipments.

While the higher gravity fuel oils have not shown as marked a tendency toward price advances the demand has been good all week, refiners making these grades have reported, and prices have moved up slightly. With the season for the high gravity, low cold test oils drawing near a close there would be less tendency toward higher prices than would be the case for the lower grades which can be used more profitably in the milder months.

THE bulk of the gasoline buying has been from jobbers. Exporters were generally inactive, due almost entirely to the refusal of refiners to sell any quantities of gasoline at prices being offered. At least three buyers had standing offers of 6.625 cents for 64-66, 375 e.p. gasoline, f.o.b. north Texas refineries most of the week, but only about 250,000 gallons were reported bought this week. One buyer advised his home office that the price would have to be raised before he could get any quantity of goods. He received the reply that the price could not be raised until prices at the Gulf showed a tendency to move higher.

It was learned Saturday that one export company late Friday withdrew its offer of 6.625 cents on 64-66, 375 e.p. gasoline. Another company, which had bought the 250,000 gallons at that price had reduced its offer to 6.50 cents.

Lower gravity gasolines were in somewhat better demand than they have been for several weeks, and prices accordingly moved up. Refiners reported a fair demand throughout the week for 58-60, and 60-62, U. S. Motor gasolines. The Sinclair Refining Co. announced a price advance to 6.50 cents this week on its grade of gasoline, while one or two other companies advanced their quotations on U. S. Motor to 6.25 cents. As the week progressed sales of 58-60 U. S. Motor at under 6 cents became scarce while more sales at above 6 cents were being reported.

High gravity gasolines were in steady demand from the trade. No price changes were noted during the week. One or two fair sized sales to jobbers for over the month were reported, one sale being 50 cars of 64-66, 375 e.p. gasoline at 6.75 cents a gallon.

Demand for Grade AA, which could be moved on export freight rates to the Gulf, continued fair, and prices moved up fractionally during the week. Domestic demand for this grade was marking time, a majority of refiners reported. Grade C was offered more freely from several sources. Prices lost a little ground. The prevailing price today on Grade C was 4.25 to 4.50 cents, with odd cars of distress goods going to resale agents at 4.125 cents.

Grades B and BB were generally unchanged in price with demand reported not as active as was the case the previous week.

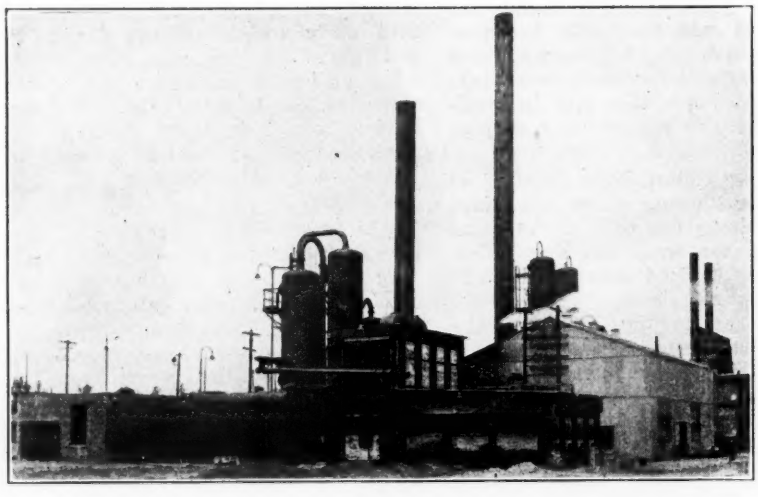
ONE export buyer this week purchased around 500,000 gallons of 41-43 kerosene. All but around 25 cars of this purchase, however, was to replace a previous purchase after the refiner who had accepted the original order found he was unable to get out the goods.

Domestic demand for kerosene was generally light. Prices on 41-43 w.w. treated grade, however, remained at 4.125 to 4.25 cents. One or two refiners were quoting slightly higher prices. It was generally believed this goods was going to storage in

(*Continued on Page* 117)

SIMMS GAS

A Specialty Plant —



AT SMACKOVER, ARKANSAS

devoted exclusively to the production of

ANTI-KNOCK GASOLINES

"A Trial Car Is Convincing Evidence"

Two popular grades; Simms Straight for Summer use or Blending; Simms Special for Winter Use.

SIMMS OIL COMPANY

Producers-Refiners-Marketers

General Offices: DALLAS, TEXAS

Refineries

DALLAS

SMACKOVER

Refinery Markets on Light Oils and Lubricants

Prices given below are in cents per gallon, F. O. B. refinery, except where $ is shown

(These Refinery Prices compiled in the OIL PRICE HANDBOOK for a whole year)

GASOLINE AND NAPHTHA

PENNSYLVANIA	Prices Feb. 20	Prices Feb. 13	Prices Feb. 6
52-54 Naphtha	7.75 – 8.00	7.75 – 8.00	7.75 – 8.00
54-56 Naphtha	7.75 – 8.00	7.75 – 8.00	7.75 – 8.00
58-60 U.S. Motor 437 e.p.	7.50 – 8.00	7.50 – 8.00	7.75 – 8.00
60-62 390 e.p. gasoline	8.25 – 9.00	8.25 – 9.00	8.25 – 9.00
64-66 375 e.p. gasoline	9.00 – 9.50	9.00 – 9.50	9.00 – 9.50
68-70 Str.-run gas. 350-360 e.p.	10.00 –10.50	10.00 –10.50	10.00 –10.50
OKLAHOMA			
48-50 450 e.p. naphtha	†5.50	†5.375– 5.50	†5.375– 5.50
50-52 450 e.p. naphtha	†5.50	†5.375– 5.50	†5.375– 5.50
56-58 450 e.p. gasoline	**5.75	**5.50 – 5.75	**5.50 – 5.75
58-60 450 e.p. gasoline	**5.75 – 6.00	**5.50 – 5.875	**5.50 – 5.875
58-60 U. S. Motor, 437 e.p.	6.1050	6.0980	5.9474
60-62 437 e.p. gasoline	6.3802	6.4677	6.4326
60-62 400 e.p. gasoline	6.6875	6.5000	6.5250
64-66 390 e.p. gasoline	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75
64-66 375 e.p. gasoline	7.0000	7.0250	7.0000
68-70 350 360 e.p. gasoline	7.00 – 7.25	7.00 – 7.25	7.00 – 7.25

Above are weighted average prices, current week's prices being effective on Saturday, instead of Monday, the last day on which weighted averages are available for publication in this table. Weighted average prices for the current Monday are published on page 37 of this issue. The two previous week's prices shown are corrected to show Monday's prices, effective on the dates shown at the top of the columns.

KANSAS (F. O. B. refinery Kansas destination)			
58-60 U.S. Motor 437 e.p.	6.25 – 6.375	6.25 – 6.375	6.125– 6.375
60-62 400 e.p. gasoline	6.75	6.75	6.75
64-66 375 e.p. gasoline	7.375	7.375	7.375
NORTH TEXAS			
48-52 450 e.p. naphtha	†5.50 – 5.75	†5.50	†5.50
56-58 450 e.p. gasoline	†5.75	†5.50	†5.50
58-60 450 e.p. gasoline	†5.75 – 5.875	†5.50	†5.50
58-60 U.S. Motor 437 e.p.	†6.00 – 6.25	6.00 – 6.25	†6.00
60-62 400 e.p. gasoline	6.25 – 6.375	6.25 – 6.375	6.25 – 6.375
64-66 390 e.p. gasoline	6.375– 6.50	6.375– 6.50	6.375– 6.50
64-66 375 e.p. gasoline	6.75	6.75	6.75
68-70 350-360 e.p. gasoline	7.125– 7.25	7.125– 7.25	7.125– 7.25
NORTH LOUISIANA (N. La., Ark. and Miss. destination)			
58-60 U.S. Motor gasoline	6.375– 6.50	6.25 – 6.50	6.25 – 6.50
ARKANSAS (Arkansas destination only)			
56-58 450 e.p. gasoline	6.25	6.25	6.25
58-60 450 e.p. gasoline	6.25	6.25	6.25
58-60 U.S. Motor 437 e.p.	6.50	6.50	6.375
CALIFORNIA			
*54-58 U.S. Motor 437 e.p.	7.00 – 8.50	7.00 – 8.50	7.00 – 8.50
*58-60 U.S. Motor 437 e.p.	8.00 – 9.50	8.00 – 9.50	8.00 – 9.50
*42-45 Eng. dis. 445-480 e.p.	6.50 – 7.00	6.50 – 7.00	6.50 – 7.00

*2c tax to be added if used in state.

NATURAL GASOLINE

(Note: End point of all grades, not over 375* F. Since Oct. 1, 1927 all naturals must pass corrosion test.)

OKLAHOMA			
Grade AA, 80-87.9, 90% Recovery	†5.50 – 5.75	†5.375– 5.625	†5.375– 5.625
Grade A, 72-79.9, 90% Recovery	†5.50 – 5.75	†5.625	†5.375– 5.625
Grade BB, 84-92, 85% Recovery	†4.625	†4.625	†4.75 – 4.875
Grade B, 76-83.9, 85% Recovery	†4.75	†4.75 – 4.875	†4.75 – 4.875
Grade C, 80-90, 78% Recovery	†4.25 – 4.50	†4.25 – 4.375	†4.50 – 4.625
NORTH TEXAS (F. O. B. Breckenridge)			
Grade AA, 80-87.9, 90% Recovery	†5.50 – 5.75	†5.375– 5.625	†5.375– 5.625
Grade A, 72-79.9, 90% Recovery	†5.50 – 5.75	†5.375– 5.625	†5.375– 5.625
Grade BB, 84-92, 85% Recovery	†4.625	†4.625	†4.75 – 4.875
Grade B, 76-83.9, 85% Recovery	†4.75 – 4.875	†4.75 – 4.875	†4.75 – 4.875
Grade C, 80-90, 78% Recovery	†4.375– 4.50	†4.50	†4.50 – 4.625
NORTH LOUISIANA (F. O. B. Monroe District)			
Grade AA	†5.75 – 6.00	†5 75 – 6.00	†6.00
Grade BB	†5.00 – 5.25	†5.00 – 5.25	†5.00 – 5.25
Grade C	†4.75 – 5.00	†4.75 – 5.00	†4.75 – 5.00
CALIFORNIA			
75-85, 375-390 e.p. blend	7.50 – 8.00	7.00 – 7.50	7.00 – 7.50

MOTOR FUEL BLENDS

PENNSYLVANIA			
68-70 Blend 437 e.p.	Prices	.....	.....
64-66 Blend 437 e.p.	temporarily	.....	.....
60-62 Blend 437 e.p.	discontinued	.....	.....
OKLAHOMA			
64-66 Blend 437 e.p.	†5.75 – 6.00	†5.75 – 6.00	†5.625– 6.00

BURNING OILS

PENNSYLVANIA			
45 w.w. kerosene	6.25 – 6.50	6.25 – 6.50	6.25 – 6.375
46 w.w. kerosene	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75
47 w.w. kerosene	7.00 – 7.25	7.00 – 7.25	7.0 (– 7.25
300 mineral seal	7.25 – 7.50	.....	.....
OKLAHOMA			
41-43 w.w. kerosene	4.125– 4.25	4.125– 4.25	4.125– 4.25
42-44 w.w. kerosene	4.50 – 4.625	4.50 – 4.625	4.50 – 4.625
KANSAS (F. O. B. refinery Kansas destination)			
41-43 w.w. kerosene	4.75 – 5.00	4.50 – 5.00	4.50 – 5.00
42-44 w.w. kerosene	5. 0 – 5.625	5.50 – 5.625	5.50 – 5.625
NORTH TEXAS			
40-42 w.w. kerosene	†4.125	†4.125	†4.00 – 4.125
41-43 w.w. kerosene	†4.375	†4.375	†4.25 – 4.375
NORTH LOUISIANA (N. La., Ark. and Miss. destination)			
41-43 w.w. kerosene	4.75 – 5.00	4.75 – 5.00	4.75 – 5.00
ARKANSAS (Arkansas destination only)			
42-44 kerosene	4.75 – 5.00	4.75 – 5.00	4.75 – 5.00
CALIFORNIA			
38-40 w.w. kerosene	5.00 – 5.50	5.00 – 5.50	5.00 – 5.50

NEUTRAL OIL

Vis.	PENNSYLVANIA	(Viscosity at 70°F.)		
200	No. 3 Assoc. Filt.	33.00 –34.00	33.00 –34.00	33.00 –34.00
180	No. 3 Assoc. Filt.	30.00 – 32.00	30.00 –32.00	30.00 –32.00
150	No. 3 Assoc. Filt.	27.00	27.00	27.00
		(Non Viscous)		
34	Grav. 330-340 Flash	7.25 – 7.75	7.25 – 7.75	7.25 – 7.75
36	Min. Neut. 300-305 Flash	6.50 – 7.00	6.50 – 7.00	6.50 – 7.00

Vis.	Color	**OKLAHOMA (Viscosity at 100°F.)		
100	No. 2	6.00 – 6.50	6.00 – 6.50	6.00 – 6.50
150	No. 3	8.00 – 8.50	8.00 – 8.50	8.00 – 8.50
150	No. 4	8.00 – 8.50	8.00 – 8.50	8.00 – 8.50
180	No. 3	9.00 –10.00	9.00 –10.00	9.00 –10.00
180	No. 4	9.50 – 9.75	9.50 – 9.75	9.50 – 9.75
180	No. 5	9.25 – 9.75	9.25 – 9.75	9.25 – 9.75
200	No. 3	9.50 –11.00	9.50 –11.00	9.50 –11.00
200	No. 4	9.50 –10.75	9.50 –10.75	9.50 –10.75
200	No. 5	8.50 –10.50	8.50 –10.50	8.50 –10.50
220	No. 3	12.50 –13.50	12.50 –13.50	12.50 –13.50
220	No. 4	12.25 –12.50	12.25 –12.50	12.25 –12.50
220	No. 5	11.50 –12.00	11.50 –12.00	11.50 –12.00
140	No. 3	13.50 –14.00	13.50 –14.00	13.50 –14.00
240	No. 4	13.25 –13.50	13.25 –13.50	13.25 –13.50
240	No. 5	12.00 –13.00	12.00 –13.00	12.00 –13.00
280	No. 3	15.50 –16.50	15.50 –16.50	15.50 –16.50
280	No. 4	15.25	15.25	15.25
280	No. 5	14.00 –15.00	14.00 –15.00	14.00 –15.00
300	No. 5-6	17.00	17.00	17.00

Vis.	Color	GULF COASTAL (Viscosity at 100°F., pour test 0)		
100	No. 2 Unfilt. Pale	6.75 – 7.25	6.75 – 7.25	6.75 – 7.25
200	No. 3 Unfilt. Pale	9.25 –10.00	9.25 –10.00	9.25 –10.00
300	No. 3 Unfilt. Pale	10.25 –11.00	10.25 –11.00	10.25 –11.00
500	No. 3½ Unfilt. Pale	12.25 –13.00	12.25 –13.00	12.25 –13.00
750	No. 4 Unfilt. Pale	14.25 –15.00	14.25 –15.00	14.25 –15.00
200	No. 5½ Red Oil	7.25 – 8.00	7.25 – 8.00	7.25 – 8.00
300	No. 5½ Red Oil	8.25 – 9.00	8.25 – 9.00	8.25 – 9.00
500	No. 6 Red Oil	9.75 –10.50	9.75 –10.50	9.75 –10.50
750	No. 6 Red Oil	12.25 –13.00	12.25 –13.00	12.25 –13.00

Vis.	Color	CALIFORNIA (Viscosity at 100°F.)		
100	No. 2	9.00 – 9.50	9.00 – 9 50	9.00 – 9.50
100	No. 3	7.50 – 8.00	7.50 – 8.00	7.50 – 8.00
200	No. 3	9.50 –10.00	9.50 –10.00	9.50 –10.00
300	No. 3	10.50 –11.00	10.50 –11.00	10.50 –11.00
450	No. 3-3½	13.00 –13.50	13.00 –13.50	13.00 –13.50
550	No. 3-3½	14.50 –15.00	14.50 –15.00	14.50 –15.00
600	No. 3-3½	15.00 –15.50	15.00 –15.50	15.00 –15.50
100	No. 5	6.50	6.50	6.50
200	No. 5	8.00 – 8.50	8.00 – 8.50	8.00 – 8.50
300	No. 5	9.00 – 9.50	9.00 – 9.50	9.00 – 9.50
400	No. 5	11.00 –11.50	11.00 –11.50	11.00 –11.50
500	No. 5	11.00 –11.50	11.00 –11.50	11.00 –11.50
600	No. 5	12.00 –12.50	12.00 –12.50	12.00 –12.50
700	No. 7	14.00 –14.50	14.00 –14 50	14.00 –14.50

CYLINDER STOCKS

OKLAHOMA			
190-200 Vis. at 210° Brt. St.	31.00 –32.00	31.00 –32.00	31.00 –32.00
150-160 Vis. at 210° Brt. St.	22.00 –25.00	22.00 –25 00	22.00 –25.00
600 E St. 140-150 Vis.-210°	17.00 –18.00	17.00 –18.00	17.00 –18.00
(O) St. Ref. Olive Green	8.50 –10.00	8.50 –10.00	8.50 –10.00
600 St. Ref. Dark Green	6.75 – 8.00	6.75 – 8 00	6.75 – 8.00
Black Oil	5.00	5.00	5.00
PENNSYLVANIA	(1-inch Immersion Test)		
600 Steam Refined	9.00 –10.50	9.00 –10.50	9.00 –10.50
650 Steam Refined	11.25 –12.25	11.25 –12.25	11.25 –12.25
600 Flash	16.00 –16.50	16.00 –16.50	16.00 –16.50
625 Flash	26.00 –27.00	26.00 –27.00	26.00 –27.00
600 Warren E	16.50 –17.00	16.50 –17.00	17.00 –18.00
600 Oil City E	15.00 –16.00	15.00 –16.00	15.00 –16.00
600 D Filtered	24.50 –25.50	24.50 –25.50	24.50 –25.50
Cold Test Stock, 40-50 p. p., 140-150 vis. at 210°, 540-550 flash, No. 8 color	28.00 –30.00	28.00 –30.00	28.00 –30.00
40-50 p.p., 140-150 vis. at 210, 540-550 flash, No. 6-6½ color diluted	26.00 –28.00	26.00 –28.00	26.00 –28.00
††Extra low cold test stock 15 p.p., 155-160 vis. at 210, 545 flash, No. 6½ color	37.00	37.00	.....

(Note—Prices of total immersion test goods average 1 to 3 cents per gallon higher)

†PRICES NOMINAL ††ONLY ONE REFINER QUOTING *QUOTATIONS ONLY **REPRESENTS BOTH SALES AND QUOTATIONS

CO-RE-CO

100% PURE PENNSYLVANIA OIL

PURE PENNSYLVANIA PETROLEUM PRODUCTS — CORECO — 1885

A SUPER PENNSYLVANIA MOTOR OIL for the INDEPENDENT JOBBER

Since 1885 we have been refining "The highest grade crude in the world." We even refine this crude to so high a degree of perfection as to produce a Super Pennsylvania Motor Oil.

Compare the specifications of our CORECO MOTOR OILS with those of ANY oil you may choose.

	GRAVITY	FLASH	FIRE	VIS. @ 100	VIS. @ 212
Coreco Light	30.3	440	505	235	49
Coreco Medium	29.8	450	520	390	60
Coreco Heavy	29.0	465	540	700	75
Coreco Ex. Heavy	28.1	485	560	1065	97
Coreco Spec. Duty	27.8	495	575	1425	106

CORECO affords a profitable business building opportunity for the independent jobber and our CORECO exclusive territory contract is as attractive as are the specifications of our Superior Pennsylvania Motor Oils.

CORECO distribution is available to independent jobbers and distributors only. Attractive territories for exclusive distribution are still open in some very productive districts, which will be granted to reliable jobbers.

Write our Main Office for further details.

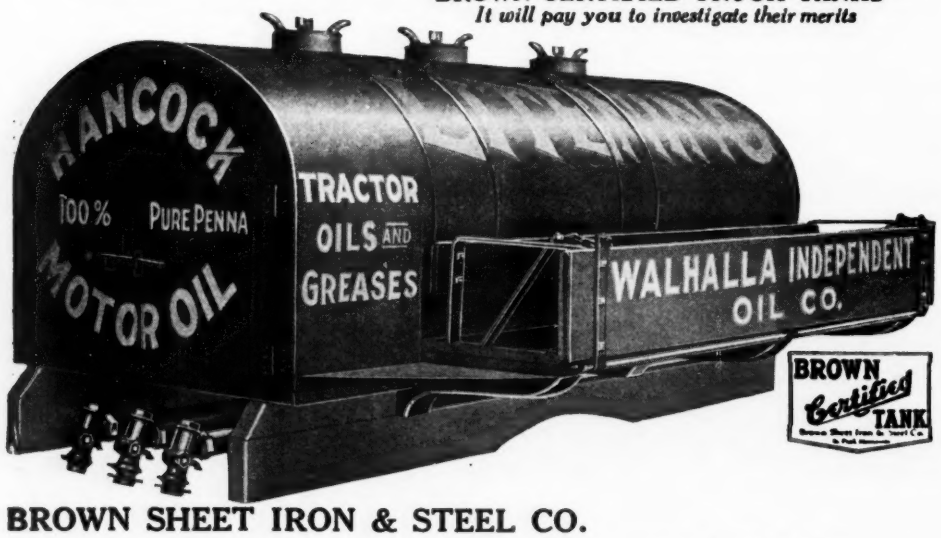
CONTINENTAL REFINING CO. — — OIL CITY, PA.

BROWN GUARANTEED OIL-TIGHT TRUCK TANKS

From coast to coast BROWN CERTIFIED TANKS are the standard of comparison. There are no secrets nor patents on these tanks, just good, honest, full weight material, correctly built by real tradesmen.
When you buy a truck tank you dont want to purchase substitutes, nick-nacks, nor freak experiments, You WANT, and have a RIGHT TO EXPECT, EFFICIENT SERVICE, OIL TIGHT DELIVERY, and ATTRACTIVE APPEARANCE.
These are the reasons why hundreds of successful Oil Companies have standardized on

BROWN CERTIFIED TRUCK TANKS

It will pay you to investigate their merits



Partial list of ou Products:
- Bulk Storage Tanks. Double Electric Welded.
- Truck and Tractor Tanks.
- Lube Oil Tanks, Steam Heated and Insulated.
- Compounding Kettles Steam Jacketed with Agitators.
- Northwestern Steel Barrel Headquarters.

BROWN SHEET IRON & STEEL CO. **ST. PAUL, MINN.**

Tear out this coupon and mail it today

We are interested in your tanks. Send your catalog and prices.

Make of Truck..... Year..... We operate..... (number) Tank Trucks

Other equipment on which you may send prices.....

Name..... Address.....

Refinery Markets on Wax and Heavy Oil Products

Prices given below are in cents per gallon, F. O. B. refinery, except where $ is shown

(For quick reference to Refinery Prices, get the OIL PRICE HANDBOOK, published annually)

WAX

PENNSYLVANIA Per Pound, New York	Prices Feb. 20	Prices Feb. 13	Prices Feb. 6
122-124 white crude scale	3.125– 3.25	3.25	3.125– 3.25
124-126 white crude scale	3.125– 3.25	3.25	3.125– 3.25
**OKLAHOMA			
*124-126 White Crude Scale	3.125– 3.25	3.125– 3.25	3.125– 3.25
CALIFORNIA			
White crude scale, per pound, ton lots	6.00 – 6.50	6.00 – 6.50	6.00 – 6.50

FUEL OIL

PENNSYLVANIA			
36-40 fuel oil	5.00 – 5.25	4.75 – 5.125	4.75 – 5.00
30-34 fuel oil	4.875– 5.125	4.75 – 5.00	4.75 – 5.00
28-32 fuel oil	4.875– 5.125	4.75 – 5.00	4.75 – 5.00
OKLAHOMA			
38-40 straw distillate	3.00 – 3.375	3.25 – 3.375	3.25 – 3.375
36-38 straw distillate	3.00 – 3.125	3.00 – 3.125	3.00 – 3.125
*32-36 gas oil, straw	†2.625– 2.75	†2.625– 2.75	†2.625– 2.75
*32-36 dark gas oil	2.50	2.50	2.50
28-30 fuel oil (in bbls.)	$0.925– 0.975	$0.925– 0.975	$0.925– 0.975
26-28 fuel oil (in bbls.)	$0.90	$0.85 – 0.90	$0.85 – 0.90
24-26 fuel oil (in bbls.)	**$0.875	**$0.825–0.85	**$0.825– 0.85
22-26 fuel oil (in bbls.)	**$0.85 –0.875	**$0.80– 0.825	**$0.80– 0.825
18-22 fuel oil (in bbls.)	**$0.80 –0.825	**$0.775	**$0.775
16-18 fuel oil (in bbls.)	**$0.75 –0.775	**$0.75	**$0.725–0.75
14-16 fuel oil (in bbls.)	**$0.75 –0.775	**$0.75	**$0.725–0.75

*Zero cold test low flash goods sell for ¼ cent more per gallon.
Zero cold test fuel oils sell for 5 to 15 cents more per bbl.

KANSAS (F. O. B. refinery Kansas destination.)			
38-40 straw distillate	3.50 – 3.75	3.50 – 3.75	3.50 – 3.75
36-38 straw distillate	3.25	3.25	3.25
32-36 gas oil	2.75 – 2.875	2.75 – 2.875	2.75 – 2.875
24-26 fuel oil	*$0.90– 1.00	*$0.90 – 1.00	*$0.90– 1.00
18-22 fuel oil	*$0.85	*$0.85	*$0.85
NORTH TEXAS			
38-40 straw distillate	3.25 – 3.375	3.25 – 3.375	3.25 – 3.375
32-36 gas oil, cracked	2.25 – 2.375	2.25 – 2.375	2.25 – 2.375
32-36 gas oil, uncracked	2.25 – 2.375	2.25 – 2.375	2.25 – 2.375
24-26 fuel oil (in bbls.)	$0.725– 0.75	$0.725– 0.75	$0.725– 0.75

GULF COASTAL	Prices Feb. 20	Prices Feb. 13	Prices Feb. 6
Fuel (in bbls.)	$1.40 –$1.50	$1.40 –$1.50	$1.40 –$1.50
Gas oil	4.375– 4.50	4.375– 4.50	4.375– 4.50
NORTH LOUISIANA (N. La., Ark. and Miss. destination)			
32-36 gas oil, dark	3.00 – 3.125	3.00 – 3.125	3.00 – 3.125
32-36 gas oil, straw	3.125– 3.25	3.125– 3.25	3.125– 3.25
16-20 fuel oil (in bbls.)	$1.00	$1.00	$1.00
ARKANSAS (Arkansas destination only)			
32-36 gas oil, straw	3.25 – 3.50	3.25 – 3.50	3.25 – 3.50
32-36 gas oil	3.00	3.00	3.00
28-32 gas oil	2.75	2.75	2.75
CALIFORNIA (F. O. B. San Joaquin Valley. At San Francisco, 4c per bbl. more)			
14-18 fuel oil (in bbls.)	$0.60 –$0.75	$0.60 –$0.75	$0.60 –$0.75
14-18 Bunker oil (in bbls.)	$0.80 –$1.00	$0.80 –$1.00	$0.80 –$1.00
30-34 gas oil (in bbls.)	$1.05 –$1.10	$1.05 –$1.10	$1.05 –$1.10
27 Plus Diesel oil (in bbls.)	$0.90 –$1.00	$0.90 –$1.10	$0.90 –$1.00

PETROLATUMS

PENNSYLVANIA (In cents per pound in tank cars; in barrels, in car lots ¾c per pound more.)			
Snow White	8.875	8.875	8.875
Lily White	7.875	7.875	7.875
Cream White	6.875	6.875	6.875
Light Amber	3.875	3.875	3.875
Amber	3.50	3.50	3.50
Red	3.25	3.25	3.25
Green No. 5 color	2.625	2.625	2.625

**PETROLEUM COKE

Oklahoma

(Per ton in car lots)			
Lump	$5	$5	$5
Still run	$3	$3	$3
Breeze	$2	$2	$2

†PRICES NOMINAL ††ONLY ONE REFINER QUOTING *QUOTATIONS ONLY **REPRESENTS BOTH SALES AND QUOTATIONS

(*Continued from Page* 113)

anticipation of a good spring demand.

Distillate shipments remained about on a par with other weeks this season, but refiners said this was due primarily to contract movement. Spot orders have been comparatively scarce. Prices have been generally unchanged in Oklahoma, but some goods have been offered from differential territories on a Group 3 freight basis slightly under the prices being obtained by Oklahoma plants.

No changes were noted in gas oils in Oklahoma. Louisiana refiners indicated orders were slower, and other districts reported movement generally unchanged.

Prices on Oklahoma neutral oils and cylinder stocks passed through the week with virtually no changes. A majority of refiners reported demand had slowed up somewhat since the first of the year. A majority of refiners making wax, continued to report they were sold up for this month, with a few unable to accept any new business before April.

NEW YORK, Feb. 18.—A new brokerage concern for crude and refined products has just been organized by Marcus B. Whitney and Ernest G. Stillman, to operate as M. B. Whitney & Co. Headquarters are at 11 Broadway here.

Little Trading Reported In Export Lubes

NEW YORK, Feb. 18.—Except for slight recessions in prices for Pennsylvania bright stock and steam refined stocks, there was little change in export markets for lubricants this week. Buyers showed little interest in the market. Trading was light.

Dark Pennsylvania bright stock was offered 1-cent cheaper this week at 33 cents a gallon in barrels at New York and an occasional sale at this price was reported. Steam refined 600 unfiltered, was off 0.25-cent to 16 cents, and 600 flash was reported available at 20.50 cents a gallon this week, against a minimum of 21 cents a week ago.

South Texas pale oils, except for a slight stiffening in 500 vis. No. 3 color, were generally unchanged. Prices of red oils did not fluctuate. Trading was reported at a standstill.

Export and Domestic Wax Markets are Quiet

Staff Special

NEW YORK, Feb. 18.—A lull in foreign buying pervaded wax markets this week. South American buyers who have been active in the New Orleans market until recently, were absent. United Kingdom buyers displayed only nominal interest because considerable Polish wax is going into the United Kingdom at present, it was said.

White crude scale at New Orleans was generally unchanged. Most sellers quoted 3.25 to 3.50 cents a pound. But wax was not freely offered, largely because of greatly curtailed production in the Mid-Continent.

At New York, white crude scale was slightly lower at 3.125 to 3.25 cents a pound, with occasional sales of small lots at these prices. Yellow scale was quoted 0.125 cent lower at 3 cents flat.

The market for fully refined waxes was slow and prices were unchanged. It was said by several large buyers that 125-127 A.m.p. was practically unobtainable.

Oil Burner Regulations Available

BOSTON, Feb. 18.—Regulations of the National Board of Fire Underwriters for construction and installation of oil burning equipment, edition of 1925, are available at the National Fire Protection Association, 40 Central St., Boston. The regulations are divided into two sections, one for construction and installation other than domestic, and the other for domestic burners.

Gasoline Advances ⅛ Cent In Chicago Market

Staff Special
CHICAGO, Feb. 18

THE Chicago market ended the week in an unsettled condition. Gasoline prices continued to advance. Fuel oils were at high levels reached during the past ten days. The recent cut in heavy Mid-Continent crude by Magnolia Petroleum Co. caused considerable discussion in the local trade. Opinions as to the probable effect of the cut differed considerably but the consensus was that it would probably have no immediate effect on the market. Heavy snowfall the past two days coupled with near zero weather contributed uncertainty to the market.

Gasoline continued its upward climb which has characterized the recent market. Practically all refiners and marketers in Chicago territory report raising their quotations. One refiner advanced to a new quotation of 6.50 cents on 58-60 U. S. Motor. Several refiners moved up to 6.25 cents and the remainder of the trade were quoting from 6 cents upward. Jobbers were following their policy of buying only for immediate requirements, most of the trade reported. However, nearly all sellers said business was good for this season. U. S. Motor, 58-60, began the week at 6 to 6.125 cents with a gradual upward revision until the top of the range was 6.25 cents on Saturday.

Higher gravity gasoline demand was steady throughout the week, with prices approximately .125 cent higher by Saturday. The 60-62, 437 e.p. grade sold mostly at 6 to 6.25 cents in the early part of the week and at 6.125 to 6.25 cents thereafter. The 60-62, 400 e.p. gasoline moved at 6.375 to 6.50 cents Monday, at 6.50 cents flat Tuesday and Wednesday and ended the week at 6.50 to 6.625 cents. Gasoline of 64-66, 375 e.p. moved at 6.875 to 7 cents until Saturday when most sales were reported at 7 cents.

Several sellers reported fairly good demand for kerosene, while others indicated to the contrary. Majority of sales of 41-43 w.w. were 4.125 to 4.25 cents throughout the week.

Distillates continued to move steadily at the price level which has prevailed for some months. Most sales of 38-40 straw were at 3.25 to 3.375 cents.

The gas oil situation was practically the same this week as at the close of business last week. Prices were generally unchanged and a steady demand was reported for all grades throughout the week. Ordinary dark 32-36 gas oil moved throughout the week at 2.625 to 2.75 cents. A like product, with a zero cold test, sold at 2.875 to 3 cents. Straw zero 32-36 gas oil continued to command a price of 3.125 to 3.25 cents.

Not only were the zero fuel oils scarce this week but most of the trade reported that it was becoming more difficult to obtain goods of higher cold test. Several refiners reported sold up on all grades of fuel oils and practically all others were well supplied with orders. Prices of the lower gravities were advanced approximately 2.50 cents during the week.

Fuel oil of 28-30 gravity moved mostly at $1.00 to $1.10 all week. Fuel of 24-26 gravity sold at $0.85 to $0.90 with some sales of zero goods reported up to $0.95. The 22-26 fuel moved at $0.85 to $0.90 during the closing days of the week after beginning at $0.825 to $0.90. The ordinary grade of 18-22 fuel oil sold at $0.775 to $0.825 on Monday and Tuesday and at $0.80 to $0.825 thereafter.

Smackover crude fuel was in better demand this week, following reductions in price made possible by last week's crude cut. Prices were nearly the same as for heavier grades of Oklahoma fuel oils and the result was a considerable increase in inquiries. The majority of sales and quotations were at $0.90 to $1.00 late in the week after moving at $0.95 to $1.00 during the early days.

The sun shone on last Feb. 2 and (if the legend is true) the prophetic groundhog returned to his hole to escape six more weeks of winter. The record snow of the winter accompanied by subnormal temperatures, which the groundhog watchers have been expecting ever since, came to Standard of Indiana territory on Friday but the weather man predicts early relief. The outlook for the middle west is for brief periods of precipitation next week with variable temperatures but mostly near seasonal normal.

PLATT'S
OILGRAM
Petroleum Markets-Every Day

HOW SURE ARE YOU?

If you were to place an order *today* for gasoline, or kerosene, or fuel oil, or lubricating oil—

How sure would you be that you were buying *at the right time* and *at the actual market?*

Did you hear of a tankwagon cut today in another territory, which might indicate a cut coming in yours? Or, did crude change today? Or, did some one put in a big buying order for export which will stiffen the gasoline market ¼ cent or so tomorrow?

A large part of your profits come from *daily accurate knowledge* of market prices and conditions.

PLATT'S OILGRAM brings you this market information from an unbiased source daily. Costs only 30 cents a day—a year for $75, or 3 months for $25. It's your greatest aid to showing PROFIT at the end of the year.

TULSA—904 World Bldg.
CHICAGO—35 E. Wacker Drive
NEW YORK—342 Madison Ave.
CLEVELAND—730 Penton Bldg.

Week's Price Changes Tank Wagon Markets

Gasoline Changes

Standard of Indiana—T. w. price gasoline advanced 2 cents, s. s. 4 cents, Wichita, to 14.8 cents and 16.8 cents respectively, including 2 cent tax, **Feb. 8.**

Crude Price Changes

DALLAS—On Feb. 18 Magnolia Petroleum Co. reduced heavy crude in Oklahoma, Kansas and Texas where it is purchasing on a gravity basis, in amounts ranging from 13 to 30 cents. All oil of 32 degrees gravity and above was unchanged, conforming with Prairie's schedule of March 12, 1927. These new prices were posted: below 30, $0.75, a cut of 30 cents; 30-30.9, $0.90, a cut of 26 cents; and 31-31.9, $1.05, a cut of 13 cents.

Car Load Marketer Buys Jobbing Business

CHICAGO, Feb. 18.—L. A. Stewart, of wide acquaintance and long experience as a refinery sales manager and car load marketer in the Chicago oil community, recently purchased the Evanston Economy Oil Co., of Evanston, Ill. The property consists of a bulk plant and six service stations in Evanston and Niles Center. He is operating them under the name of Community Service Stations.

The jobbing company has its headquarters at Davis and Elmwood streets, Evanston. Mr. Stewart will continue to conduct his carload marketing business with quarters in the Pure Oil building, 35 E. Wacker Dr., Chicago.

BRADFORD, Pa., Feb. 18.—The Kendall Refining Co. was on the air again the evening of Feb. 14 when it broadcast its "Further Travels Through An Oil Refinery" through station WGY at Schenectady, N. Y.

Tank Wagon, Service Station Markets for Gasoline and Kerosene In United States Territories and Canada

(As posted by principal marketing companies)

(OIL PRICE HANDBOOK has t.w. and s.s. markets for whole year arranged for quick reference)

These Prices In Effect February 20, 1928

S.O. NEW JERSEY TERRITORY

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W.
Atlantic City, N. J.	16	2	18	20	14
Newark, N. J.	16	2	18	20	14
Annapolis, Md.	16	4	20	23	12
Baltimore, Md.	16	4	20	23	10
Cumberland, Md.	16	4	20	23	14
Washington, D. C.	16	2	18	21	12
Danville, Va.	16	4½	20.5	*	14
Norfolk, Va.	16	4½	20.5	23.5	12
Richmond, Va.	14	4½	18.5	21.5	14
Roanoke, Va.	16	4½	20.5	23.5	14
Petersburg, Va.	16	4½	20.5	23.5	14
Charleston, W. Va.	16	4	20	23	14
Keyser, W. Va.	16	4	20	23	14
Parkersburg, W. Va.	14	4	18	21	14
Wheeling, W. Va.	16	4	20	23	14
Charlotte, N. C.	16	4	20	23	14
Hickory, N. C.	16	4	20	20	14
Mt. Airy, N. C.	16	4	20	23	14
Salisbury, N. C.	16	4	20	23	14
Charleston, S. C.	15	5	20	23	14
Columbia, S. C.	15	5	20	23	14

*Dealers set own prices. S. O. New Jersey does not operate station.

S. O. NEW YORK

Due to local price conditions at many points in S. O. New York territory, actual prices on both gasoline and kerosene are being made at under the posted tank wagon prices published below.

New York City	17	0	17	21	15
Albany, N. Y.	13	0	13	15	15
Buffalo, N. Y.	13	0	13	16	14
†Rochester, N. Y.	13	0	13	16	12
Syracuse, N. Y.	15	0	15	15	15
Boston, Mass.	17	0	17	15	15
Augusta, Me.	17	4	21	21	15
Manchester, N. H.	17	4	21	23	15
Burlington, Vt.	17	3	20	22	15

†It is reported that S. O. New York is selling a second grade of gasoline at Rochester, 3c below the above posted prices which apply on its Socony grade.

ATLANTIC REFINING

Pittsburgh, Pa.	16	*	16	*22	13
Philadelphia, Pa.	15	*	15	*21	13
Allentown, Pa.	16	*	16	*22	13
Erie, Pa.	12	*	12	*18	13
Scranton, Pa.	16	*	16	*22	13
Altoona, Pa.	16	*	16	*22	13
Dover, Del.	16	3	19	22	13
Wilmington, Del.	16	3	19	22	12
Providence, R. I.	15	2	17	17	15
Boston, Mass.	15	0	15	15	15
Springfield, Mass.	16	0	16	16	15
Worcester, Mass.	15	0	15	15	15
Hartford, Conn.	16	2	18	18	15
New Haven, Conn.	16	2	18	18	15

*3-cent state tax is collected by retail dealer and paid by him directly to state.

S. O. KENTUCKY

Lexington, Ky.	13	5	18	21	15.5
Louisville, Ky.	13	5	18	21	15
Covington, Ky.	14	5	19	22	15.5
Clarksdale, Miss.	13	4	17	20	11.5
Gulfport, Miss.	††14.5	4	††18.5	21.5	14
Jackson, Miss.	13	4	17	20	12
Natchez, Miss.	12.5	4	16.5	19.5	14
Vicksburg, Miss.	12.5	4	16.5	19.5	14
Birmingham, Ala.‡	13	4	17	18	14.5
Mobile, Ala.‡	14	4	18	21	14
Montgomery, Ala.*‡	9	4	13	16	15.5
Atlanta, Ga.	12	4	16	18	†14
Augusta, Ga.	14	4	18	20	†16.5
Macon, Ga.	9	4	13	16	†13.5
Savannah, Ga.	13	4	17	19	†14.5
Jacksonville, Fla.°	12	5	17	18	13.5
Miami, Fla.°	15	5	20	23	14.5
Tampa, Fla.°	13	5	18	21	13
Pensacola, Fla.°	**14	5	**19	22	13

*Local privilege tax of 1 cent on gasoline and ½ cent on kerosene at Montgomery included.

‡Alabama gasoline prices include 1/40 of 1c inspection fee. Mobile gasoline prices include 1c city tax.

†Georgia kerosene prices include 1c state tax.

°Florida gasoline prices include ½c inspection fee.

**Both tank wagon prices include 1c city tax at Pensacola, which went into effect Oct. 15, 1926.

††Both tank wagon prices at Gulfport include Harrison county privilege tax of 2c.

S. O. INDIANA

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W.
Chicago, Ill.	14	2	16	18	12
Decatur, Ill.	13.5	2	15.5	17.5	12.1
E. St. Louis, Ill.	13.1	2	15.1	17.35	11.2
Joliet, Ill.	14.4	2	16.4	18.4	12.3
Peoria, Ill.	12	2	14	14	12.1
Quincy, Ill.	14.2	2	16.2	18.2	11.9
Indianapolis, Ind.	12.2	3	15.2	16.2	13.2
Evansville, Ind.	14	3	17	19	13
South Bend, Ind.	14.4	3	17.4	17.4	13.4
Detroit, Mich.	12.8	3	15.8	17.8	13.7
Grand Rapids, Mich.	14.7	3	17.7	19.7	13.6
Saginaw, Mich.	14.9	3	17.9	19.9	13.8
Green Bay, Wis.	14.6	2	16.6	18.6	12.4
Madison, Wis.	14.3	2	16.3	18.3	12.1
Milwaukee, Wis.	14.1	2	16.1	18.1	11.9
La Crosse, Wis.	15.2	2	17.2	19.2	13
Minneapolis, Minn.	13	2	15	15	12.9
Duluth, Minn.	13.5	2	15.5	17.5	12.9
Mankato, Minn.	12.1	2	14.1	16.1	12.7
Des Moines, Ia.	12.9	3	15.9	17.9	12.3
Davenport, Ia.	12.5	3	15.5	17.5	12.3
Sioux City, Ia.	14.1	3	17.1	19.1	11.9
Mason City, Ia.	14.5	3	17.5	19.5	12.3
St. Louis, Mo.	*13.6	2	15.6	17.9	11.3
Kansas City, Mo.	†12.9	2	14.9	16.9	10.6
St. Joseph, Mo.	†12.5	2	14.5	16.5	11.2
Fargo, N. D.	13	2	15	17	14.9
Grand Forks, N. D.	17.2	2	19.2	21.2	15.2
Minot, N. D.	16.9	2	18.9	20.9	14.9
Pierre, S. D.	15.5	4	19.5	21.5	13.9
Huron, S. D.	15.5	4	19.5	21.5	13.9
Wichita, Kans.	12 8	2	14.8	16 8	10.8
Bartlesville, Okla.	12.8	3	15.8	17.8	10.8

S. O. Indiana's quantity discount schedule on tank wagon deliveries of gasoline outside the city of Chicago is 1c for 50 gals. or more at one delivery; 1½c for 6,000 gals. or more a month; 2c for 10,000 gals. or more a month, and 3c for 15,000 gals. or more a month.

In Chicago, above discounts apply, except that minimum required quantity to get the 1c discount is 100 gals., instead of 50 gals. This 1c discount applies on quantities of 100 gals. and over, in addition to regular Q.D.A. discounts applying thru rest of territory, as stated above.

Service station discount is 2c per gal. to consumers of 200 gals. or more a month, or 2400 gals. per year.

Discount on kerosene is 1c on 50 gal. dumps throughout territory.

*Includes city tax of ½c.

†Includes city tax of 1c.

S. O. NEBRASKA

Omaha, Neb.	15.25	2	17.25	17.25	12.25
McCook	12.75	2	14.75	16.75	11.50
Norfolk	14.75	2	16.75	18.75	12.75
North Platte	15.75	2	17.75	18.5	13.50
Scottsbluff	15.25	2	17.25	19.25	13.00

CONTINENTAL OIL

Denver, Colo.	13	3	16	18	12.5
Pueblo, Colo.	13	3	16	18	14.5
Grand Junction, Colo.	17.5	3	20.5	22.5	18
Casper, Wyo.	14	3	17	19	13
Cheyenne, Wyo.	15	3	18	20	14.5
Butte, Mont.	19.5	3	22.5	22.5	19
Helena, Mont.	19.5	3	22.5	24.5	19
Salt Lake City, Utah	16.5	3½	20	21	17
Boise, Ida.	19.5	4	23.5	25.5	19
Twin Falls, Ida.	19.5	4	23.5	25.5	19
Albuquerque, N. M.	16	5	21	24	17

S. O. CALIFORNIA*

Phoenix, Ariz.	19	4	23	27	21.5
Los Angeles, Cal.	13.5	3	16.5	20.5	15.5
Fresno, Cal.	14	3	17	21	16.5
San Francisco, Cal.	14	3	17	21	15.5
Reno, Nev.	18	4	22	26	19
Portland, Ore.	14.5	3	17.5	21.5	16.5
Seattle, Wash.	14.5	2	16.5	20.5	16.5
Spokane, Wash.	18.5	2	20.5	24.5	20.5
Tacoma, Wash.	14.5	2	16.5	20.5	16.5

*On Oct. 1, t.w. price at all points for spot sales, was advanced 1c. Very large portion of deliveries are under contract carrying above prices. New customers signing contracts and selling only one brand of gasoline, are given prices published in above table.

S. O. LOUISIANA

Little Rock, Ark.	11	5	16	16	11
Alexandria, La.	13	2	15	18	†14
Baton Rouge, La.	12	2	14	17	†12.5
Lake Charles, La.	13.5	2	15.5	18.5	†14
New Orleans, La.	13.5	2	*15.5	*18.5	†14
Shreveport, La.	13.5	2	15.5	18.5	†13
Lafayette, La.	13	2	15	18	†13.5
Bristol, Tenn.	16	3	19	22	14
Chattanooga, Tenn.	16.5	3	19.5	22.5	15
Knoxville, Tenn.	16.5	3	19.5	22.5	15
Nashville, Tenn.	15	3	18	21	15
Memphis, Tenn.	14	3	17	18.5	14

*New Orleans gasoline prices include 1c parish tax in addition to 2c state tax, and kerosene prices include 1c state tax and 1c parish tax.

†Kerosene price in Louisiana includes 1c state tax.

S. O. OHIO

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W
All Ohio points	14	3	17	19	14

MAGNOLIA PETROLEUM

Muskogee, Okla.	10	3	13	16	10
Oklahoma City	10	3	13	14	10
Tulsa, Okla.	10	3	13	14	10
Fort Smith, Ark.*	13	*3	16	19	10
Little Rock, Ark.	11	5	16	16	11
Texarkana, Ark. *	12	*3	15	18	12
Dallas, Tex.	9	3	12	15	11
Fort Worth, Tex.	11	3	14	16	10
Houston, Tex.	10	3	13	15	15
San Antonio, Tex.	10	3	13	15	10
El Paso, Tex.	11	3	14	15	16

*Within City of Texarkana and Fort Smith, the state tax on gasoline is 3c per gal. conforming with the Texas state tax. In these two districts outside of the city the 5c Arkansas tax applies.

V. M. & P. NAPHTHA

(Changes ordinarily occur coincident with gasoline price changes)

	Oleum Spirits	V.M. & P. Naphtha	Cleaner Naphtha
Chicago	14.7	16.7	.3
Detroit	16.4	17.9	19.7
Kansas City	†14.9	†16.4	†18.2
Milwaukee	15.4	*18.9	*20.7
Minneapolis	*18.7	*20.2	*22
St. Louis	14.6	16.1	17.9
New York	...	19	...

Note: Above prices on Oleum Spirits and V. M. & P. Naphthas went into effect January 3, 1928.

*Includes 2c state tax.

†Includes 1c city tax.

CANADA

(Per Imperial Gallon, which is 1.2 American Gallons)

ONTARIO

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W.
Toronto	19.5	3	22.5	26	21
Ottawa	19.5	3	22.5	26	21
Cochrane	24.5	3	27.5	36	26
Ft. William	24.5	3	27.5	31	23.5

MANITOBA

Winnipeg	24.5	3	27.5	31	23.5

SASKATCHEWAN

Regina	27.5	0	27.5	32	26.5

ALBERTA

Edmonton	26.5	3	29.5	33	25.5
Calgary	22.5	3	25.5	29	23.5

BRITISH COLUMBIA

Vancouver	21	3	24	28	22

QUEBEC

Montreal	20.5	3	23.5	27	21
Quebec City	22.5	3	25.5	31	23
Three Rivers	22.5	3	25.5	29	23

NEW BRUNSWICK

St. John	24.5	3	27.5	32	24
Moncton	24.5	3	27.5	32	24

NOVA SCOTIA

Halifax	24.5	3	27.5	32	24
Sydney	24.5	3	27.5	32	24

PRINCE EDWARD ISLAND

Charlottetown	24.5	3	27.5	31	24

Note: In districts surrounding these points 1c additional is added to city price.

Export Fuel Trade Reported Good But Light Oils are Quiet

Staff Special
NEW YORK, Feb. 18

EXPORT demand for the chief petroleum products was disappointing again this week. Not a single cargo of light oil was reported sold for foreign shipment from the Gulf although one inquiry was reported filled, possibly abroad. Several cargoes of bunker oil were sold. The sale of a small lot of French specification gas oil for shipment from a north Atlantic port was reported.

There were a few inquiries for gasoline in the market early this week, but because suppliers were asking higher prices than those at which the last deals were closed, the business was said to have been placed elsewhere. The trade was unable to learn who took the business. One buyer said his requirements had been filled.

One cargo consisted of approximately 50,000 barrels of 64-66, 375 end point gasoline for February-March shipment to a French oil concern. United States suppliers quoted 8.25 to 8.375 cents, and the gasoline was finally bought at 8.125 cents the buyer said.

A broker who held an inquiry from a French buyer for 42,000 barrels of U. S. Motor and 64-66, 375 end point gasoline, said a leading supplier had offered 7 cents and 8.125 cents, respectively, for the business and that these prices would stand for 60-day shipment and prices would be 0.125 cent higher for April-May loading.

Suppliers were in accord in their ideas of U. S. Motor prices, almost all of them quoting 7 cents. There were buyers who felt that 6.875 cents could still be done on firm offer.

Kerosene quotations were generally unchanged with most suppliers asking 6.50 cents for water white and 5.50 cents for prime white.

Foreign demand for gas oil continued light and there were no sales for shipment from Gulf ports reported this week. Approximately 25,000 barrels of French specification material sold at around 4.50 cents for north Atlantic immediate shipment. Gas oil, 26 gravity plus, was quoted at 4 cents at the Gulf.

In some quarters it was felt that heavy fuel was no longer available at $0.90 a barrel at the Gulf after sales of five cargoes at around this price this week. Buyers, however, reported they were still receiving 90-cent offers as late as Friday.

For bunkering, Grade C sold at $1.10 to $1.15 a barrel.

Prices in other seaboard districts were generally unchanged. U. S. Motor was 8 to 8.25 cents at Philadelphia and Baltimore; 8.25 cents at Norfolk, Va., and Wilmington, N. C., and 8 cents at Charleston, S. C. At Savannah, Ga., and Jacksonville, Fla., gasoline was still available at 7.50 to 7.75 cents.

Water white kerosene was still quoted at a minimum of 6.75 cents in southern districts and as high as 7.50 cents in northern districts.

Heavy burning oil prices were without material change, although furnace oil in the New England district was reported available in some instances as much as 0.75 cent lower.

Distress bunker oil continued to bob up, but for the most part a buyer was quickly found and the offerings did little toward disturbing the general market. The posted price of Grade C bunker oil was unchanged at $1.35 in New York harbor. In Philadelphia ships were bunkered as low as $1.15 a barrel.

Eastern Spot Gasoline is Dull; Price Wars Worry Trade

Staff Special
NEW YORK, Feb. 18

WITH little or no spot demand, eastern gasoline markets continued to mark time this week. Prices in most parts of the Atlantic seaboard were the same Saturday as Monday. Exceptions were U. S. Motor in New York harbor and New England markets.

Retail markets, which are pretty bad in some communities, again caused more concern than refinery markets. The case of Wilkes-Barre, Pa., where dealers are selling gasoline anywhere from 7 to 7.50 cents a gallon at curb pumps against a delivered tank car cost of 9.50 cents, was looked upon with distress by the trade in New York and Philadelphia. The price war in Wilkes-Barre began when one marketer sold five gallons of gasoline at 7.50 cents a gallon provided the customer took a quart of oil at 25 cents. Other marketers met the 7.50-cent price and some dropped their price to 7 cents.

Service stations in Boston posted prices from 12 to 15 cents a gallon, the latter being the posted price of the Standard Oil Co. of New York.

At refineries and seaboard terminals in the Boston district, U. S. Motor gasoline was quoted at an f.o.b. price of 9.25 cents by all major sellers. One or two refiners said they were selling at a minimum delivered price of 10 cents.

It was reported jobbers who are heavily stocked with cheap gasoline, are not buying but those in need of gasoline are paying the higher prices which are an advance of approximately 1.50 cents in a little more than 10 days.

In the Providence district, sellers were asking 8.75 to 9.25 cents, f.o.b. refinery or seaboard terminal, for U. S. Motor gasoline.

Meeting competition at 7.75 cents became sufficiently frequent in the New York harbor market that goods moving at this price were partly representative of the general market. Several sellers not only met the 7.75-cent price their regular customers said they were receiving from other sources, but openly quoted 7.75 cents, and estimated that approximately 30 per cent of the small volume of business done this week was at this figure. Several suppliers continued to get business at 8 cents and a few asserted they were not booking orders at less than 8.25 cents.

In checking over their January shipments some important sellers were surprised at the sharp fall shipments had taken. One important New York supplier said his shipments had fallen 900,000 gallons from December shipments. January and February weather this year has been open so the break in shipments was baffling.

Gulf Coast Lubes Quiet

HOUSTON, Feb. 20.—Gulf Coastal lubricant markets are quiet again. Most of the business reported moving is on regular contracts. Spot sales are slack for this season of the year after an active half month in February. Prices generally are firmer at existing levels than previously.

LOS ANGELES, Feb. 20.—California Petroleum Corp. is building a distributing plant at Portland, Ore., to cost approximately $800,000. The plans call for storage space for 11,000,000 gallons of refined products. The company last year established a distributing station at Seattle and the Portland facilities will enable the company to handle the business in Oregon more conveniently and with greater dispatch.

Complete Seaboard Market

(Export markets for whole year given in OIL PRICE HANDBOOK. Each volume carries refinery, tank wagon, crude and export markets—complete for the years 1924-1925-1926-1927)

Eastern Domestic Market

(Prices for tank car lots, f.o.b. refinery or seaboard terminal, represent majority of quotations and sales.)

	Feb. 20	Feb. 13	Feb. 6
U.S. Motor gasoline, New York harbor	8.00	8.00	8.00
U.S. Motor gasoline, Philadelphia	8.00 – 8.25	8.00 – 8.25	8.00 – 8.25
U.S. Motor gasoline, Boston district	9.00 – 9.25	8.75 – 9.25	8.75 – 9.25
U.S. Motor gasoline Providence district	8.25 – 8.75	8.25 – 8.75	8.25 – 8.75
U.S. Motor gasoline, Baltimore	8.00 – 8.25	8.00 – 8.25	8.00 – 8.25
U.S. Motor gasoline, Norfolk	8.25	8.25	8.25
U.S. Motor gasoline, †Wilmington, N. C.	8.25	8.25	8.25
U.S. Motor gasoline, Charleston	8.00	8.00	8.00
U.S. Motor gasoline, Savannah	7.75	7.75	7.75
U.S. Motor gasoline, Jacksonville	7.50 – 7.75	7.50 – 7.75	7.50 – 7.75
California U.S Motor gasoline, †New York Harbor	8.25	8.25	8.25
California U.S. Motor gasoline, Baltimore	8.50	8.50	8.50
California U.S. Motor gasoline. Philadelphia	8.25	8.25	8.25
Water white kerosene, New York Harbor	7.00 – 7.50	7.00 – 7.50	7.00 – 7.50
Water white kerosene, Philadelphia	6.75 – 7.00	6.75 – 7.00	6.75 – 7.00
Water white kerosene, Baltimore	7.25 – 7.50	7.25 – 7.50	7.25 – 7.50
28-34 gas oil, New York harbor	4.50 – 5.00	4.50 – 5.00	4.50 – 5.00
28-34 gas oil, Boston district	4.50 – 4.75	4.50 – 5.00	4.50 – 5.00
38-42 furnace oil, New York harbor	5.75	5.75	5.75 – 6.00
36-40 furnace oil, Boston district	5.50 – 5.75	5.75	5.75
Grade C bunker oil, New York harbor	$1.35	$1.35	$1.35
Grade C bunker oil, Boston district	$1.35	$1.35 –$1.40	$1.35 –$1.40
Diesel oil, New York harbor	$2.10	$2.10	$2.10

Note: Above prices do not include inspection tax levied in some states.

MEDICINAL OILS

Russian 885-890 s.g., 325-330 vis	$0.80 – 0.90	$0.80 – 0.90	$0.80 – 0.90
Russian 870-875 s.g., 150-155 vis	$0.67 – 0.77	$0.67 – 0.77	$0.67 – 0.77
Russian 860-865 s.g., 80-85 vis	$0.65 – 0.75	$0.65 – 0.75	$0.65 – 0.75

†Only one refiner quoting.

New York Export Market

(Gasoline and kerosene in cases in bulk. Lubricating oils are per gal. in bbls. Cylinder oils are Penna. products.)

	Feb. 20	Feb. 13	Feb. 6
U. S. Motor gasoline	23.65	23.65	23.65
43-45, 150 w.w. kerosene	17.90	17.90	17.90
42-44, 110 s.w. kerosene	16.90	16.90	16.90
CYLINDER OILS			
Bright stock, dark	33.00 –34.50	34.00 –35.00	34.00 –35.00
600 D filtered	30.00 –31.00	30.00 –31.00	30.00 –31.00
600 Warren E filtered	23.50 –25.00	23.50 –25.00	23.50 –25.00
600 s.r. unfiltered	16.00 –17.00	16.25 –17.25	16.00 –17.25
650 s.r. unfiltered	18.75 –19.50	18.75 –19.50	18.50 –19.50
600 flash s.r.	20.50 –21.00	22.00 –23.00	20.00 –21.00
630 flash, s.r.	33.00 –34.00	34.00 –35.00	33.00
RED ENGINE OILS (Vis. 100°)			
300 vis. No. 6½ color	20.00	20.00	20.00
250 vis. No. 6 color	19.00	19.00	19.00
200 vis. No. 6 color	18.50	18.50	18.50
PALE ENGINE OILS (Vis. 100°)			
230 vis. No. 3¾ color	24.00	24.00	24.00
180 vis. No. 3¼ color	20.00	20.00	20.00
100 vis. No. 2¼ color	15.75	15.75	15.75
MOTOR OILS (Vis. 100°)			
600 vis. No. 7 color	35.00	35.00	35.00
500 vis. No. 6½ color	33.00	33.00	33.00
400 vis. No. 7¼ color	31.00	31.00	31.00
300 vis. No. 6 color	30.00	30.00	30.00
200 vis. No. 3¼ color	24.00	24.00	24.00
MEDICINAL OILS			
875-885 s.g.	$0.80	$0.80	$0.80
865-870 s.g.	$0.70	$0.70	$0.70

WAXES (In cents per pound, f.a.s. carload lots)

WHITE CRUDE SCALE (In barrels)

	Feb. 20	Feb. 13	Feb. 6
122-124 A.m.p.	3.125– 3.25	3.15 – 3.25	3.125– 3.15
124-126 A.m.p.	3.125– 3.25	3.15 – 3.25	3.125– 3.15
FULLY REFINED (In burlap bags)			
123-125 A.m.p. Phila.	4.00	4.00	3.875– 4.00
125-127 A.m.p.	4.00	4.00	4.00
128-130 A.m.p.	4.125– 4.25	4.125– 4.25	4.125
130-132 A.m.p.	4.25 – 4.375	4.25 – 4.375	4.25 – 4.50
133-135 A.m.p.	*5.25 – 5.50	*5.25 – 5.50	*5.25 – 5.50
135-137 A.m.p.	*5.50 – 6.00	*5.50 – 6.00	*5.50 – 6.00
YELLOW CRUDE SCALE			
124-126 A.m.p.	3.00	3.00 – 3.125	3.00

*Prices nominal.

Gulf Export Market

(F.O.B. Gulf oil terminals in Texas and Louisiana, shipments of 20,000 bbls. and over, except where otherwise noted.)

GASOLINE	Feb. 20	Feb. 13	Feb. 6
U. S. Motor	7.00	7.00	7.00
60-62, 400 e.p.	7.75	7.75	*7.625– 7.75
61-63, 390 e.p.	7.875– 8.00	7.875– 8.00	7.875– 8.00
64-66, 375 e.p.	8.125– 8.375	8.125– 8.375	8.125– 8.375
U. S. Motor, cases (cargoes)	$1.60	$1.60	$1.60
64-66, cases (cargoes)	$1.75	$1.75	$1.75

*Nominal.

KEROSENE			
44 water white	6.50	6.50	6.50 – 6.625
41-43 prime white	5.50	5.50	5.50 – 5.625
Water white, cases (cargoes)	$1.55	$1.55	$1.55
Prime white, cases (cargoes)	$1.45	$1.45	$1.45
DOMESTIC GAS & BUNKER OILS			
*26-28 gas oil	4.00	4.00	4.00 – 4.125
*30-32 gas oil	4.00	4.00 – 4.25	4.00 – 4.25
Grade C bunker oil	$1.00 –$1.15	$1.00 –$1.15	$1.00 –$1.15
Grade C bunker oil, cargoes	$0.90 –$0.95	$0.90 –$0.95	$0.90 –$0.95

*Translucent thru neck of 4 oz. bottle.

MEXICAN CRUDE AND BUNKER OILS (F.O.B. Steamer, Tampico)

Heavy Panuco crude taxes to be paid	$1.05	$1.05	$1.05
Grade C bunker oil, for bunkering purposes, taxes paid	$1.20	$1.20	$1.20

SOUTH TEXAS LUBRICATING OILS (Viscosity at 100° F.; cold test 0) (Tanker, f.o.b. Houston)

100 vis. No. 2 unfiltered pale	5.50 – 6.00	5.50 – 6.00	6.00
200 vis. No. 3 unfiltered pale	7.50 – 8.00	7.50 – 8 00	7.50 – 8.00
300 vis. No. 3 unfiltered pale	8.875– 9.00	8.875– 9.00	8.875– 9.25
500 vis. No. 3 unfiltered pale	11.00 –11.25	11 00	11.00 –11.25
200 vis. No. 5½ red oil	6.875– 7.00	6.875– 7.00	6.875– 7.25
300 vis. No. 5½ red oil	8.00 – 8.125	8.00	8.00 – 8.50
500 vis. No. 6 red oil	9.00 – 9.50	9.00 – 9.50	9.00 – 9.625

Pacific Export Market

(Quotations are at seaboard, Los Angeles, in cargo lots, cents per gallon, except where otherwise noted.)

	Feb. 20	Feb. 13	Feb. 6
Gasoline, U. S. Motor, 53-55 Gravity	6.25 – 6.75	6.25 – 6.75	6.00 – 6.50
Gasoline, U. S. Motor, blends and special cuts	7.00 – 8.00	7.00 – 8.00	7.00 – 8.00
Gas Oil. 30-34, per barrel	$1.05 –$1.10	$1.05 –$1.10	$1.05 –$1.10
Diesel Oil, 27 plus, per barrel	$0.95 –$1.05	$0.95 –$1.05	$0.95 –$1.05
Bunker oil, 14-18, per barrel	$0.80 –$1.00	$0.80 –$1.00	$0.80 –$1.00
Fuel oil. 14-18, per barrel	$0.70 –$1.00	$0.72 –$1.00	$0.70 –$1.00
Kerosene, 38-40 w.w., 125-150 flash, per gal.	4.50 – 5.00	4.50 – 4.75	4.50 – 5.00
Cased Goods			
Gasoline, U. S. Motor	$1.70 –$1.80	$1.70 –$1.80	$1.65 –$1.75
Kerosene, 38-40 w.w., 125-150 flash	$1.35 –$1.45	$1.35 –$1.45	$1.35 –$1.45

Crude Oil Prices, as Posted by Major

(Crude prices for years 1924-1925-1926-1927 in

EASTERN FIELDS

(Posted by Joseph Seep Purchasing Agency)

Penna. Grade Oil in New York Transit Lines (Allegheny, N. Y. District)	$2.80
Bradford District Oil in National Transit Lines (Bradford District)	2.80
Penna. Grade Oil in National Transit Lines (Other Pennsylvania)	2.65
Penna. Grade Oil in Southwest Penna. Pipe Lines (Other Pennsylvania)	2.65
Penna. Grade Oil in Eureka Pipe Lines (West Virginia)	2.60
Penna. Grade Oil in Buckeye Pipe Lines (Macksburg, O. district)	2.35
Keister Grade in National Transit Lines (Butler Co)	1.10
Cabell Grade in Eureka Pipe Lines (West Virginia)	1.35
Corning Grade in Buckeye Pipe Lines (Ohio)	1.55
Corning, O. heavy grade	1.45
*Somerset Oil in Cumberland Pipe Lines (Kentucky)	1.45
Ragland Grade in Cumberland Pipe Lines (Kentucky)	.95

*Somerset oil run prior to Oct. 1922, takes price of 6 cents lower than above quotations.

(Posted by Stoll Oil Refining Co.)

Oil City, Ky., oil in Stoll lines.....$1.50

CENTRAL STATES FIELDS

Posted by Ohio Oil Co.

Effective March 14, 1927

Wooster	$1.57	Plymouth	$1.33
Lima	1.55	West Kentucky	1.33
Waterloo	1.20	*Canadian Petro.	1.95
Indiana	1.32	*Oil Springs	2.02
Princeton	1.60	*Posted by Imperial Oil Ltd.	
Illinois	1.60		

OKLAHOMA, KANSAS And NORTH TEXAS

Prices of Prairie Oil & Gas Co.

(In Oklahoma, Kansas, North and East Central Texas)

Effective March 12, 1927

28-28.9	$1.12	35-35.9	$1.26
29-29.9	1.14	36-36.9	1.28
30-30.9	1.16	37-37.9	1.30
31-31.9	1.18	38-38.9	1.32
32-32.9	1.20	39-39.9	1.34
33-33.9	1.22	40-40.9	1.36
34-34.9	1.24	41-41.9	1.38
42-42.9	$1.40	48-48.9	$1.52
43-43.9	1.42	49-49.9	1.54
44-44.9	1.44	50-50.9	1.56
45-45.9	1.46	51-51.9	1.58
46-46.9	1.48	52 and above	1.60
47-47.9	1.50		

Above schedule met on March 12, by Gulf, Mid-Continent Pet. Corp., and Empire; by Carter, Humble and The Texas Co. on March 14.

Humble Oil & Refining Co. Prices (Ranger, North Texas, Mexia, Powell, Richland, Wortham, Lytton Springs, Currie, Moran and Nocona crudes all in Texas.)

March 14, same schedule as Prairie in above fields, except these grades posted Nov. 16:

Below 25	$0.90	26-26.9	$1.08
25-25.9	1.06	27-27.9	1.10
Mirando, Tex			$1.00

Magnolia Petroleum Co. (In Oklahoma, Kansas and North and East Central Texas)

Magnolia schedule in above fields and in Panola Co., same as Prairie's, except these grades, posted Feb. 16:

Below 30	$0.75
30-30.9	0.90
31-31.9	1.05
Glasscock and Howard Counties	$0.60
Chalk-field (Howard Co.)	$0.80
Iatan district	$0.93
Corsicana heavy	$1.00

Carter Oil Co. (Oklahoma and Kansas)

March 14, same schedule as Prairie

PANHANDLE, TEXAS

Humble Oil & Refining Co.

Effective Aug. 23

Hutchinson, Carson and Wheeler Counties	$0.75

Pampa, Gray County, Effective March 14:

28-28.9	$0.80	37-37.9	$0.98
29-29.9	.82	38-38.9	1.00
30-30.9	.84	39-39.9	1.02
31-31.9	.86	40-40.9	1.04
32-32.9	.88	41-41.9	1.06
33-33.9	.90	42-42.9	1.08
34-34.9	.92	43-43.9	1.10
35-35.9	.94	44 and above	1.12
36-36.9	.96		

WEST TEXAS

Humble Oil & Refining Co.

Effective Aug. 23

Crane, Upton, Crockett and Pecos Counties	$0.60

NORTH LOUISIANA—ARKANSAS FIELDS

Prices of Standard Oil Co. of Louisiana Caddo, Homer, Haynesville, Bull Bayou, El Dorado, Crichton and De Soto.

Effective March 14, 1927

Below 28	$1.10	40-40.9	$1.36
28-28.9	1.12	41-41.9	1.38
29-29.9	1.14	42-42.9	1.40
30-30.9	1.16	43-43.9	1.42
31-31.9	1.18	44-44.9	1.44
32-32.9	1.20	45-45.9	1.46
33-33.9	1.22	46-46.9	1.48
34-34.9	1.24	47-47.9	1.50
35-35.9	1.26	48-48.9	1.52
36-36.9	1.28	49-49.9	1.54
37-37.9	1.30	50-50.9	1.56
38-38.9	1.32	51-51.9	1.58
39-39.9	1.34	52 and above	1.60
*Smackover, below 24			$0.75
* do 24 and above			.90
Bellevue			1.25
Cotton Valley			.75
**Urania, La.			.75
†East El Dorado			1.00

**Posted by Louisiana Oil Refining Corp.

†Posted by Magnolia Petroleum Co.

*Smackover prices posted on Feb. 7 by S. O. La., Gulf, Shreveport-El Dorado Pipe Line, Atlantic Oil Producing Co. and The Texas Co.; on Feb. 8 by Magnolia; on Feb. 6, by La. Oil Refg. Corp.

STEPHENS, ARKANSAS

Atlantic Oil Producing Co. and Louisiana Oil Refining Corp.

Below 28	$1.00	30-30.9	$1.06
28-28.9	1.02	31-31.9	1.08
29-29.9	1.04	32 and above	1.10

GULF COASTAL

Posted by Humble Oil & Refining Co.

Effective March 14

Grades A	$1.20	29-29.9	$1.25
Grades B:		30-30.9	1.27
Below 25	1.15	31-31.9	1.29
25-25.9	1.17	32-32.9	1.31
26-26.9	1.19	33-33.9	1.33
27-27.9	1.21	34-34.9	1.35
28-28.9	1.23	35 and above	1.37

Fields classified as A and B are Spindletop, Goose Creek, Hull, Liberty, Sour Lake, West Columbia, Orange, Boling and Pierce Junction. All other fields are Grades A only.

California Prices Unchanged, Retail Market Conditions Improve

Staff Special

LOS ANGELES, Feb. 18

THE plan to shut in between 50,000 and 75,000 barrels of daily average crude production in California, starting next week, was the chief topic of conversation late this week, in marketing, as well as in all other divisions of the industry on the West coast.

There was no change in the export gasoline market situation. Plenty of buyers are seeking cargoes at a fraction under 6 cents. Some major refiners are refusing to quote less than 6.25 cents, while a few others are asking higher prices. Some gasoline could be bought for tanker movement at 6.125 cents, but this is not the market. The actual range is 6.25 to 6.75 cents. The tanker rate to East coast is 55 cents a barrel, including canal tolls.

One cargo of fuel oil sold recently at net 67 cents, at Los Angeles harbor, but the second cargo could not be bought at this price. Some fuel oil is available at 70 cents, but it cannot be shipped to East coast at this price. The tanker rate is 55 cents; this means that the fuel would cost $1.25 laid down at New York. Fuel can be shipped to New York from Venezuela for less money. It could also be moved from the Gulf at a lower figure.

The tank car market for fuel is unchanged, with prices ranging from 60 cents up to 80 cents, according to who is selling and where it is going. Gas oil is obtainable in greater quantities than for the past several weeks, but prices are fairly firm at $1.05 and up.

The local retail gasoline price war is gradually showing improvement with fewer cut price signs to be seen. The contracts made last March, giving hundreds of independent service stations a differential of 6 cents against an official differential of 4 cents, will expire in the next three or four weeks. It is expected that major companies will refuse to renew at any figure other than 4 cents differential. Some companies are now offering contracts to those who have no contracts making 3 cent differential, with a rebate of 1 cent at end of each month. It is possible that some of the companies will try to reduce the differential from 6 cents to 3 cents.

Kerosene and other products are unchanged.

Los Angeles Shipments

LOS ANGELES, Feb. 17.—During week ended Feb. 11, twenty tankers left Los Angeles harbor for points outside of Pacific coast trade territory. Total of 1,331,424 barrels, or a daily average of 190,203 barrels of petroleum products left the harbor. This is a total increase of 23,212

Purchasers, in All Fields (in Effect February 20)

OIL PRICE HANDBOOK published annually)

GULF COASTAL

Prices of The Texas Co.

(Effective March 14)

Grades A	$1.20	*Grades B	$1.15
‡Grades B (light crude):			
35-35.9	$1.37	38-38.9	$1.43
36-36.9	1.39	39-39.9	1.45
37-37.9	1.41	40 and above	1.47

*Grades B include all heavy crudes which do not meet tests for Grades A or for Gulf Coast light crude.

‡The Texas Co.'s gravity and price schedule on oil below 35° is same as Humble's postings on Grades B.

ROCKY MOUNTAIN FIELDS

Prices of Ohio Oil Co., and Midwest Refining Co.

(Salt Creek prices effective March 12)

‡Salt Creek 29-29.9	$1.14
" " 30-30.9	1.16
" " 31-31.9	1.18
" " 32-32.9	1.20
" " 33-33.9	1.22
" " 34-34.9	1.24
" " 35-35.9	1.26
" " 36-36.9	1.28
" " 37 and above	1.30
Elk Basin	1.33
Grass Creek light	1.33
Big Muddy	$1.25
Lance Creek	1.33
Rock Creek	1.25
Mule Creek	1.30
Rex Lake	1.10
‡Osage	1.33
‡Cat Creek, Mont.	1.33
Sunburst, Mont.	1.50
‡Hogback, N. Mex.	1.38
Artesia, N. Mex.	1.00

‡Posted by Midwest Refining Co. Midwest also buys Grass Creek light and Elk Basin.

The Texas Co. buys Salt Creek and Big Muddy crude.

CALIFORNIA

Standard Oil Co. of California

Santa Maria and Ventura Posted by Union Oil Co.

Gravity	Signal Hill Seal Beach Huntington Beach	Inglewood Torrance	Whittier La Habra	Newhall, McKittrick, Kern River	Olinda-Brea Cannon, Richfield	Athens-Rosecrans Dominguez	Montebello	Coyote Hills	Santa Fe Springs	Midway Sunset Buena Vista & Elk Hills	Lost Hills	Coalinga	Wheeler Ridge	Santa Maria	Ventura
14-14.9	$ .85	$ .85	$ .85	$ .75	$ .85	....	$ .85	$ .85	....	$ .75	$ .75	$ .75	$ .75	$ .85	$ .85
15-15.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
16-16.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
17-17.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
18-18.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
19-19.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
20-20.9	.85	.85	.85	....	.85	....	.85	.85	....	.77	.77	.76	.76	.85	.85
21-21.9	.86	.86	.85	....	.86	....	.85	.86	.85	.79	.79	.77	.77	.85	.85
22-22.9	.87	.87	.85	....	.87	....	.85	.87	.85	.81	.81	.78	.78	.85	.85
23-23.9	.88	.88	....	....	.88	....	.85	.88	.85	.83	.83	.79	.79	.85	.85
24-24.9	.89	.89	....	....	.89	$ .89	.85	.89	.85	.85	.85	.80	.80	.85	.85
25-25.9	.90	.90	....	....	.90	.90	.86	.90	.86	.87	.87	.81	.81	.86	.86
26-26.9	.92	.92	....	....	.92	.92	.87	.91	.87	.89	.89	.83	.82	.87	.87
27-27.9	.94	.94	....	....	.94	.94	.88	.92	.88	.91	.91	.85	.83	.88	.88
28-28.9	.96	.96	....	....	.96	.96	.89	.93	.89	.93	.93	.87	....	.89	.89
29-29.9	.98	....	....	....	.98	.98	.90	.94	.91	.96	.96	.89	....	.91	.91
30-30.9	1.00	....	....	....	1.00	1.00	.91	.95	.93	.99	.99	.91	....	.93	.93
31-31.9	1.03	....	....	....	....	1.03	....	....	.95	1.02	1.02	.93	....	....	.95
32-32.9	1.06	....	....	....	....	1.06	....	....	.97	1.05	1.05	.95	....	....	.97
33-33.9	....	....	....	....	....	1.09	....	....	.99	1.08	1.08	.97	....	....	.99
34-34.9	....	....	....	....	....	1.12	....	....	1.01	....	1.11	.99	....	....	1.01
35-35.9	....	....	....	....	....	1.15	....	....	1.03	....	....	1.01	....	....	1.03
36-36.9	....	....	....	....	....	1.18	....	....	1.06	....	....	....	....	....	1.06
37-37.9	....	....	....	....	....	1.21	....	....	1.09	....	....	....	....	....	1.09
38-38.9	....	....	....	....	....	1.24	....	....	1.12	....	....	....	....	....	1.12
39-39.9	....	....	....	....	....	1.27	....	....	1.15	....	....	....	....	....	1.15
40-40.9	....	....	....	....	....	1.30	....	....	....	....	....	....	....	....	....
41-41.9	....	....	....	....	....	1.33	....	....	....	....	....	....	....	....	....
42-42.9	....	....	....	....	....	1.36	....	....	....	....	....	....	....	....	....

*Union Oil Co. also purchases Long Beach Crude and is maintaining the same gravity and price schedule in that field as the Standard maintains in Signal Hill and Huntington Beach fields. The Union also buys and pays the same prices as the Standard in the Rosecrans-Dominguez fields, on gravities ranging from 14 degrees to and including 24.9 degrees and in Santa Fe Springs, on gravities ranging from 20 to and including 23.9 degrees.

REFINERS' and COMPOUNDERS' SUPPLIES

Following are average market prices for materials used by refiners and compounders as effective the date shown.

	Feb. 20	Feb. 13
Refiners' Supplies		
Soda Ash light 58% bags, cwt.	$1.325	$1.325
Silicate of Soda 60 deg. drums, cwt.	$1.65	$1.65
Silicate of Soda 40 deg. tank cars, cwt.	$0.60	$0.60
Silicate of Soda 40 deg. drums, cwt.	$0.80-0.95	$0.80-0.95
Sal Soda wks.	$0.90-1.10	$0.90-1.10
Caustic Soda 75% solid, cwt.	$3.66	$3.66
Chloride of Lime, cwt., wks.	$2.00	$2.00
Sulfuric Acid 60 deg. tank cars, f.o.b. shipping point per ton	$11.00	$11.00
Oleum 20%, fuming sulfuric, tank cars, wks	$18.50	$18.50
Sulfur, flowers of, cwt.	$3.10-4.00	$3.10-4.00
Liquid Chlorine, tank cars, wks, lb.	3.50-3.75	3.50-3.75
Litharge, powdered, casks, cwt.	$9.00	9.00
Compounders' Supplies		
Vegetable Oils		
Linseed carloads, spot, lb.	9.80	9.80
Tanks, spot	9.00	9.00
Soya Bean, Tanks, coast, lb.	9.75	9.75
Oleic Acid		
Distilled, tanks, lb.	9.00	9.00
Distilled, bbls, lb.	9.75	9.75
Saponified, tanks, lb.	9.25	9.25
Saponified, bbls, lb.	10.00	10.00
Lard Oils		
Prime Winter Strained, lb.	15.50	15.50
Extra Winter Strained, lb.	12.875	12.875
Extra, lb.	12.375	12.375
Extra No. 1, lb.	11.75	11.75
No. 1, lb.	11.25	11.25
No. 2, lb.	10.75	10.75
Tallow oil, lb.	11.375	11.375
Neatsfoot Oil		
Pure, bbls, lb.	15.50	15.50
Extra, bbls, lb.	12.00	12.00
No. 1, bbls, lb.	11.50	11.50
Cold Pressed, lb.	18.50	18.50
Fish Oils		
Menhaden Oil		
Light Pressed, gal.	60-62	60-62
Light Pressed, tank cars, N. Y., gal.	52	52
White, gal.	66	66
Yellow bleached, gal.	63	63
Whale, extra winter bleached, gal.	82	82
Naval Stores		
Steam distilled turpentine, N. Y., gal.	55	55
Steam distilled turpentine, Savannah, gal.	50	50
Gum turpentine, N. Y., gal.	60	61
Gum turpentine, f.o.b. cars Savannah, gal.	56	56.50
Wood Rosin F, N. Y., bbl.	$7.80	$7.80
Wood Rosin F, Savn'h, bbl.	$7.00	$7.00
Gum Rosin B, N. Y., bbl.	$8.40	$8.45
Gum Rosin B, f.o.b. cars Savannah, bbl.	$7.65	$7.85
Rosin oil, pure, gal.	55	55
Rosin oil, compounded, gal.	47	47
Pine Tar		
Kiln burnt, bbl.	*$13.00	*$13.00
Retort, bbl.	$16.00	$16.00
Alcohol		
Denatured, Formula 5, in bbls., per gal.	55-56	55-56

*Nominal.

barrels when compared with the total of the previous week.

Eleven cargoes carried a total of 614,122 barrels of fuel. The total movement included 235,631 barrels of crude, 614,122 barrels of fuel, 139,361 barrels of kerosene, 302,513 barrels of gasoline and 39,797 barrels of diesel.

OIL STOCKS AND FINANCES

National Petroleum News

Northern Pipe Line Crude Oil Traffic Falls 37 Per Cent

Staff Special

CLEVELAND, Feb. 18

MOVEMENT of crude oil through the lines of the Northern Pipe Line Co. was about 37 per cent less last year than in 1926, Pres. D. S. Bushnell has informed stockholders. The Northern is the link in the transcontinental system that receives crude oil at the Ohio-Pennsylvania line and delivers it to the lines of the National Transit Co. and the New York Transit Co. Gross earnings, however, decreased only about 13 per cent. This was due, probably, to income from government and other securities in which past profits of the company have been invested.

Net income for 1927 amounted to $339,140, or $8.48 a share on the outstanding 40,000 $100 shares of stock. In 1926 the company netted $9.37 a share on the same amount of stock, and in 1925 $7.77 a share.

The decrease in pipe line barrelage is due to the movement of crude oil by tank ship to Atlantic seaboard refineries instead of by pipe line as was done in years before 1923 when California crude oil became available for the east coast plants. Last year considerable Mid-Continent crude was moved from Gulf ports to the Atlantic coast refineries.

Directors are engaged now, Mr. Bushnell wrote, on the problem of disbursing some of the past profits to stockholders. These profits have been invested but some of the old Standard pipe line companies have reduced their capital in the last few years and disbursed part of their accumulations; for example, special dividends have been paid in the last two years by the Cumberland Pipe Line Co., Indiana Pipe Line Co., and Southern Pipe Line Co.

Condensed income accounts of Northern Pipe Line Co. for 1926 and 1927 compare:

	1927	1926
Net income	$339,140	$374,906
Dividends	320,000	320,000
Surplus	$19,140	$54,906

Balance sheets of Northern Pipe Line Co. as of Dec. 31, 1926 and 1927, compare:

ASSETS

	1927	1926
Plant	$3,095,382	$3,072,730
U. S. Bonds	1,477,250	.....
R. R. and other bonds	1,880,780	.....
Cash	126,872	*3,489,227
Acc'ts receiv.	159,142	.....
Other assets	31,069	32,711
Total	$6,770,495	$6,594,668

*Contains investments and all current assets.

LIABILITIES

Capital stock	$4,000,000	$4,000,000
Accounts payable	256,099	†606,331
Tax reserve	53,520	.....
Ins., annuity res.	418,587	.....
Depreciation	1,838,376	1,753,564
Surplus	203,913	234,773
Total	$6,770,495	$6,594,668

†Contains taxes, fire insurance and annuity reserves.

Net income of the Indiana Pipe Line Co. of which Mr. Bushnell also is president, amounted to $985,468 or $9.85 a share on 100,000 shares of $50 stock. This was the best showing this company has made since 1922 and probably reveals increased movement of crude oil from the Mid-Continent to refineries in Indiana, Ohio and western Pennsylvania. This company's net profits in 1926 were $8.18 a share; in 1925 $9.20 a share, in 1924 $5.99 a share; in 1923 $9.65 a share, and in 1922 $15.32 a share.

Of the dividends amounting to $21 a share declared last year, $15 a share was a special dividend disbursing moneys accumulated since March 1, 1913. Condensed income accounts of Indiana Pipe Line Co. for 1926 and 1927 compare:

	1927	1926
Net income	$ 985,468	$ 817,630
*Dividends	2,200,000	700,000
Deficit	†$1,214,332	$ 117,630

*Includes special dividend of $15 a share.
†Deficit.

Balance sheets of Indiana Pipe Line Co. as of Dec. 31, 1926 and 1927, compare:

ASSETS

	1927	1926
Plant	$ 5,141,907	$ 5,156,287
U. S. Bonds	1,777,452	.....
R. R. and other bonds	2,392,626	.....
Cash	184,387	*5,848,405
Acc'ts receiv.	502,864	.....
Other assets	53,368	43,380
Total	$10,052,604	$11,048,072

*Contains investments and all current assets.

LIABILITIES

Capital stocks	$ 5,000,000	$ 5,000,000
Accounts payable	396,399	†1,040,152
Tax reserve	133,369	.....
Ins., annuity reserves	800,034	.....
Depreciation	2,678,669	2,549,256
Surplus	1,044,133	2,458,664
Total	$10,052,604	$11,048,072

†Includes fire insurance, tax and annuity reserves.

Financial Notes

Intercontinent Petroleum Co.—At annual meeting in Dover, Del., eight new directors were elected. They are: George C. Lewis, George W. Steele, George H. Eddy and George F. Hilton, all of New York; Lord Strathpiey, Sir Lionel Fletcher, Col. Bennet Dampier, all of London, and F. R. D. Tod, Edinburgh.

* * *

The Texas Corp.—$25,762,075 capital stock, par value $25 a share, listed on New York Stock Exchange. This stock is to be used in exchange for California Petroleum Corp. stock.

* * *

North American Car Corp.—These directors re-elected at annual meeting: Henry H. Brigham, Erwin R. Brigham, Charles W. Folds, C. A. Johnson, and G. M. Brigham.

Special Tax Blank Ready For Kansas Oil Men

CHICAGO, Feb. 20.—Kansas has set about to collect more tax from the oil companies marketing in the state. In addition to the usual forms used in assessment, the "Merchant's Stock Statement" used by bulk stations for a number of years and the "Personal Property Statement for Merchants and Manufacturers", the Public Service Commission of the state has developed a special form for filling stations.

The principal difference in the result is that the oil man will have to go into greater detail about itemizing his equipment. The new blanks provide space for listing trucks, engines, cash registers, typewriters and safes, all separately, not letting them fall under the head of furniture and fixtures.

In addition to buildings and equipment, now the oil man must list tanks, air towers, air compressors, lighting standards, greasing racks, power lifts, and even such small items as funnels, air hose by the foot, buckets and cans, jacks and brass fittings on pipe. There are items on the blank which are not found at one filling station in 50.

Transactions in Oil Shares on New York Stock Exchange

1927 High	1927 Low	1928 High	1928 Low	Listed Capital	Par Value	Stocks	Div. Rate	Last Paid	Transactions Week Ended Feb. 18 Sales	First	High	Low	Last	Change
37⅛	27⅛	32⅜	27⅝	(sh) 922,075	N.P.	Amerada Corp.	50cQ	Jan. 31, 28	5,000	30	30	†27⅝	27⅝	— 2¾
82½	35⅛	76½	51¼	(sh) 209,180	N.P.	American Republics Corp.			14,200	60½	63⅜	54¼	55¼	— 4¾
50¼	35	41¾	37½	$56.000.000	$ 25	Associated Oil	50cQ	Dec. 24, 27	100	38	38	†37½	38	— ½
131⅜	104	109⅞	95¾	50.000.000	100	Atlantic Refining	$1Q	Dec. 15, 27	7,600	100½	101	97	98	— 3
119	115½	118¼	116	20.000.000	100	do pfd	$1.75Q	Feb. 1, 28	100	116¼	116¼	116¼	116¼	0
35½	20¾	26½	22⅛	28.558.150	25	Barndsdall Corp. A	s62½cQ	Feb. 6, 28	15,500	22⅞	22⅞	†22⅛	22⅛	— ¾
32½	20½	25¾	22	952.575	25	do B	s62½cQ	Feb. 6, 28	100	22	22	†22	22	— ¾
32⅞	20	26⅞	24	51.524.150	25	California Petroleum	25cQ	Dec. 1, 27	29,700	25	25⅛	24⅛	24⅜	— ¾
96¾	65	93¼	72	20.665.000	100	General Asphalt			16,500	76	78½	†72	72	— 4¾
144⅞	107¼	140¼	115	6.872.200	100	do pfd	$1.25Q	Dec. 1, 27	300	117¼	117¼	†115	155	— 3½
175¾	60⅜	156⅛	129	25.000.000	100	Houston Oil			28,300	133	139	†129	129¼	— 4¼
32¾	17⅝	28¼	22	(sh) 500.000	N.P.	Independent Oil & Gas	25cQ	Jan. 30, 28	9,400	24½	24⅞	†22	22	— 1⅞
12⅛	7⅜	12⅜	9	$3.280.240	$10	Indian Refining		Dec. 15, 20	4,200	10⅞	10⅞	†9	9	— 1⅜
12	7¼	10⅜	8½	4.550.110	10	do ctfs			4,800	9⅜	9½	†8½	8½	— 1
112	99	109	101	2.296.400	10	do pfd		Dec. 15, 21	100	104	104	104	104	— 1
37¾	20½	35⅞	28	(sh) 3,992.122	N.P.	Lago Oil & Transport	75cQ	Feb. 1, 28	4,300	31¾	31¾	†28	28	— 3⅞
18⅛	10	12¾	9⅞	(sh) 1.136.500	N.P.	Louisiana Oil Refining			8,200	10½	10½	†9⅞	9⅞	— ⅝
97	85¼	91	84⅛	$4.000 000	$100	do pfd	$1.75Q	Feb. 15, 28	610	86⅜	86⅜	†84⅛	84⅛	— 2⅜
22¾	12	18⅛	12¾	(sh) 330.000	N.P.	Maracaibo Oil			2,800	14	14	†12¾	12¾	— ¼
58½	31	37½	33	(sh) 2,316.647	N.P.	Marland Oil Co.		Mar. 31, 27	29,500	34⅛	34⅛	†33	33¼	— 1⅛
320	200	360	280	$45.942.800	$100	Mexican Petroleum	$3Q	Jan. 20, 28	30	280	315	†280	315	—10
....	....	....	....	12,000,000	100	do pfd	$2Q	Jan. 20, 28	....	....	....	....	....	....
9¼	3	6⅞	4⅝	(sh) 945.939	N.P.	Mexican Seaboard		Nov. 15, 24	3,200	6¼	6⅝	5⅜	5⅞	— ⅛
39⅜	25½	29½	25¼	(sh) 1.357.461	N.P.	Mid-Continent Petroleum		Aug. 1, 27	9,700	26⅜	26⅜	†25¼	25¼	— 1¼
105	97	105½	104	$6.718.000	$100	do pfd	$1.75Q	Dec. 1, 27	....	....	....	....	....	....
3¾	1⅝	3⅛	2⅜	24.354.600	10	Middle States		July 1, 23	6,600	2⅞	3	2½	2⅝	— ¼
2¾	1⅝	2¾	1⅝	5.445.620	10	do ctfs			1,300	2	2	1¾	1¾	+ ⅛
1⅞	1	1⅝	1¼	(sh) 3.500.000	N.P.	Pacific Oil			1,900	1⅜	1⅜	1⅜	1⅜	0
65⅞	40⅛	46⅜	38½	$48.807.400	$ 50	Pan American P. & T.		Oct. 20, 27	10.600	40¼	40¼	†38½	38½	— 2
66⅜	40¼	46¾	37⅞	121.097.100	50	do B		Oct. 20, 27	34,100	40¾	40⅞	†37⅞	38⅜	— 2⅜
37⅛	16¾	21	18¼	(sh) 400.000	N.P.	Pan American Western B.		Jan. 30, 27	900	18⅞	19	†18¼	18½	0
18⅛	8	16½	11⅛	(sh) 198.770	N.P.	Panhandle P. & R.			3,200	14⅛	14¼	11⅜	12	— 1½
83	54	81	77½	$2.935.200	$100	do pfd		July 2, 23	....	....	....	....	....	....
60¼	36⅛	43⅛	35½	(sh) 2.406.796	N.P.	Phillips Petroleum	75cQ	Jan. 3, 28	144.500	38	38	†35½	37	— 1⅛
1⅛	½	⅝	⅜	$29.622.925	$ 25	Pierce Oil Corp.			1,300	⅝	⅝	⅝	⅝	— ⅛
24	13½	20½	17¼	15.000.000	100	do pfd		Feb. 1, 22	....	....	....	....	....	....
5½	2½	4⅜	3½	(sh) 2.500.000	N.P.	Pierce Petroleum			500	3¾	3¾	†3½	3½	— ¼
33⅞	16¾	26	16	$37.450.850	$50	Producers & Refiners		Sept. 15, 23	11.800	22	22	†16	17	— 5
50	36⅞	45	41¼	2.845.350	50	do pfd		May 1, 25	1.500	43½	43½	†41¼	41¼	— 2
33½	25	27½	19	75.959.250	25	Pure Oil Co.	37½cQ	Dec. 1, 27	15,100	20⅝	20¾	20⅛	20⅛	— ⅞
115½	111⅜	....	....	13.000.000	100	do 8% pfd	$2Q	Jan. 2, 28	100	112	112	112	112	0
54½	44¼	48¾	44⅝	(sh) 611.303	13.40	Royal Dutch, N. Y. shares	$1.343	Jan. 28, 28	700	46½	46½	45¾	45¾	— ¼
47⅞	41⅜	42⅞	40⅜	(sh) 77.590	£2	Shell Transport & T.	97c	Jan. 23, 28	....	....	....	....	....	....
31¾	24⅝	26⅛	23¼	(sh)10.000.000	N.P.	Shell Union Oil	35cQ	Dec. 31, 27	4,900	24¼	24¾	24	24⅛	— ⅛
26⅜	14¼	24¾	19½	$7.208.080	$ 10	Simms Petroleum		Apr. 1, 27	12,500	19½	19½	18¼	18¼	— 1¼
22⅜	15	21¾	17½	(sh) 4.501.915	N.P.	Sinclair Consolidated		May 31, 24	24,400	18¾	18⅞	†17½	17½	— 1⅜
104½	97	108	102½	$16.604.600	$100	do pfd	$2Q	Feb. 15, 28	800	104	104	103½	104	— ½
37⅜	24⅛	28¼	25	27.396.590	25	Skelly Oil Co.	50cQ	Dec. 15, 27	11.700	26	26⅜	†25	25⅛	— ⅛
60¾	50⅛	56⅜	53¼	(sh)13.016.434	N.P.	S. O. California	62½cQ	Dec. 15, 27	6.400	54¼	54⅝	†53¼	53⅜	— ⅛
41⅜	35⅛	40¼	37⅜	$607.605.400	$ 25	S. O. New Jersey	‡25cQ	Dec. 15, 27	43.400	38½	38½	†37⅜	37⅛	— ¾
34⅛	29¾	31⅜	28⅜	426.973.275	25	S. O. New York	40cQ	Dec. 15, 27	21.900	29¼	29½	†28¾	29	0
34⅞	30	38	31½	(sh) 1.206.073	N.P.	Sun Oil	‡25cQ	Dec. 15, 27	3,900	38	38¼	35½	35½	— 2½
101⅝	99	102	100	$5.000.000	$100	do pfd	$1.50Q	Dec. 1, 27	100	100¼	100¼	100¼	100¼	— ¼
6½	3⅛	3⅞	2⅛	(sh) 1.121.368	N.P.	Superior Oil Corp.		Dec. 20, 20	7,600	2⅞	2⅞	†2½	2½	— ⅛
58	45	55⅜	50	$180.464.200	$ 25	The Texas Corp.	75cQ	Jan. 1, 28	27,300	51⅞	51⅞	†50	50⅜	— ⅜
18⅜	12	17	12⅛	8.380.340	10	Texas Pacific Coal & Oil	15cQ	Jan. 3, 28	25,200	13	x3	r12½	12½	— ¾
29⅛	19	22⅛	20	(sh) 2.168.404	N.P.	Tide Water Oil Co.	20cQ	Dec. 31, 27	....	....	....	....	....	....
90⅛	85	90¾	87	$20.705.200	$100	do 5½% pfd	$1.25Q	Feb. 15, 28	900	90⅛	90½	89⅞	89⅞	— ⅛
19⅛	15¾	17¼	14⅞	(sh) 4.796.101	N.P.	Tide Water Associated		Aug. 1, 27	18.500	15¼	15½	†14⅞	14⅞	— ⅜
90¾	85	87¾	83½	$72.745.900	$100	do pfd	$1.50Q	Jan. 3, 28	2,200	83½	84¾	†83½	83¾	— ⅜
10⅜	3¾	10⅛	7¼	(sh) 3,742.029	N.P.	Transcontinental Oil			25,600	7⅞	7⅞	†7¼	7⅜	— ⅛
56½	39⅜	45¼	42¾	$407.777.750	$ 25	Union Oil of California	50cQ	Feb. 10, 28	4.500	43¼	43½	43	43	+ ¼
127½	94	125	119¼	30.844.000	100	Union Tank Car Co.	$1.25Q	Dec. 1, 27	200	119½	119½	119½	119½	+ ½
34½	24½	32⅞	26	(sh) 240.380	N.P.	Warner Quinlan	50cQ	Jan. 3, 28	9,700	31⅜	31⅜	†26	28⅛	— 2⅛
27½	20	24¼	20⅜	(sh) 490,000	N.P.	White Eagle Oil & Refining	25cQ	Jan. 20, 28	1,700	21½	21½	†20⅜	20⅜	— 1⅛

*New High †New Low ‡Also extras s-Stock Total Sales 681,740

Cleveland Stock Market

February 17	Par Value	Bid	Asked	Last Sale
Canfield Oil Co.	100	....	....	....
do pfd.	100	100	....	100
Fred G. Clark	10	2¾	3½	2⅝
National Refining Co.	25	35⅛	40	36
do pfd.	100	133	135	135
Paragon Refining Co.	25	10¼	11	11
do pfd.	100	....	106½	108

x Ex-Dividend

Oil Dividends

	Amount	Stock of Record Payable	Stock of Record
Atlantic Refg. q.	$1	Mar. 15	Feb. 21
Chesebrough Mfg. q.	$1	Mar. 30	Mar. 10
Cities Service m.	10c	Apr. 2	Mar. 15
do stock	½%	Apr. 2	Mar. 15
do pfd.	50c	Apr. 2	Mar. 15
do pfd. B.	5c	Apr. 2	Mar. 15
National Transit q.	25c	Mar. 15	Feb. 29
South Penn q.	50c	Mar. 31	Mar. 14
S. O. New Jersey q.	25c	Mar. 15	Feb. 25
do extra	12½c	Mar. 15	Feb. 25
Sun Oil q.	25c	Mar. 15	Feb. 25

Pittsburgh Stock Exchange

1927 High	1927 Low	1928 High	1928 Low	Par Value	Stocks	Transactions Week Ended February 17 Sales	First	High	Low	Last	Change
9⅞	6⅞	9½	8	$ 10	Arkansas Nat. Gas.	3,700	8½	8½	†8	8	— ⅝
98⅝	80⅞	94	92	100	Columbia Gas.	....	....	....	....	....	....
107⅞	100	108	108	100	do pfd.	....	....	....	....	....	....
15	7½	10	7½	10	Devonian Oil	....	....	....	....	....	....
117½	115	116	115	100	Duquesne Light pfd.	....	....	....	....	....	....
....	....	85	80½	100	Fayette County Gas.	....	....	....	....	....	....
12¼	6	13	12	N.P.	Houston Gulf Gas.	....	....	....	....	....	....
59¼	37¼	55¾	52½	$ 25	Lone Star Gas	1,855	54¼	54½	53	53	— 1
3⅞	3	4	3¼	5	Pittsburgh Oil & Gas	....	....	....	....	....	....
8	5⅛	7¼	6¾	10	Salt Creek Cons.	....	....	....	....	....	....
26½	17	20	19⅜	10	Tidal Osage	....	....	....	....	....	....
43	33	33¼	33	N.P.	Waverly Oil Wks. A	....	....	....	....	....	....

Pittsburgh Curb Exchange

1927 High	1927 Low	1928 High	1928 Low	Par Value	Stocks	Transactions Week Ended February 17 Sales	First	High	Low	Last	Change
....	....	....	....	$ 5	Duquesne Oil	....	....	....	....	....	....
95	88	....	....	25	Gulf Oil	....	....	....	....	....	....
10¾	5½	5⅞	5½	25	Leonard Oil & Dev.	8,000	5½	5½	5½	5½	0
2.70	.30	1.00	.50	10	Omar Oil & Gas.	....	....	....	....	....	....
2¼	1¾	....	....	5	Pittsburgh Oil Dev.	....	....	....	....	....	....
31	19	21¼	17½	5	Plymouth Oil	325	19	19	†17½	17½	— 1½
6	5	....	....	5	States Oil	....	....	....	....	....	....
3⅛	1½	3⅛	2⅜	1	Texon Oil & Land	1,300	2⅝	2⅝	†2⅜	2⅜	— ¼
23¾	18	15	15	10	Tidal Osage Non-vgt.	....	....	....	....	....	....

*New High †New Low xEx-Dividend.

Standard Oil Stocks on New York Curb

1927 High	1927 Low	1928 High	1928 Low	Outstanding Capital	Par Value	Stocks	Div. Rate	Last Paid	Transactions Week Ended Feb. 18 Sales	First	High	Low	Last	Change
21⅝	17⅛	22¾	18¼	£ 4,126,460	£ 1	Anglo-American Oil	60⅓c	May 31, 27	11,000	19¾	20	19⅜	19½	— ¼
21½	17⅝	20½	18⅛	.....	£ 1	do cts. non-voting	.....	.....	800	18½	18½	18¼	18¼	+ ⅛
3⅜	¾	1⅞	1¼	(sh) 500.000	N.P.	Atlantic Lobos	.....	.....	.....	.....	.....	.....	.....	.....
6½	2½	3½	3¼	$ 10.000.000	$ 50	do pfd	.....	.....	200	3¼	3¼	3¼	3¼	— ¼
69	50	56	55	1.000.000	25	Borne Scrymser	‡$18.A.	Oct. 15, 27	50	55	55	55	55	0
60	45	63	58	10.000.000	50	Buckeye Pipe Line	$1Q	Dec. 15, 27	3,400	61¾	62	60	60	— ¾
126	76½	149¾	117¼	3,000,000	25	Chesebrough Mfg	$1Q	Dec. 28, 27	.....	.....	.....	.....	.....	.....
22⅝	16¼	22½	16⅛	36,057,840	10	Continental Oil	.....	Dec. 15, 27	23,000	18⅞	18⅞	16⅛	16⅜	— 1⅜
137	89	105	94	3,000,000	100	Cumberland Pipe Line	$2Q	Dec. 15, 27	200	103	104	103	104	+ 1
68½	47	70	64½	5,000,000	100	Eureka Pipe Line	$1Q	Feb. 1, 28	80	67	67	67	67	— 1⅝
13½	3½	6½	5	16,000,000	100	Galena Signal Oil	.....	June 30, 25	100	5	5	5	5	0
59¾	23	36	27	4.000.000	100	do new pfd	.....	June 30, 26	.....	.....	.....	.....	.....	.....
60½	35½	41¾	35	2,000,000	100	do old pfd	.....	June 30, 26	50	36	36	36	36	— 2
68½	54	68	60	73,117,577	25	Humble Oil & Refining	‡30cQ	Jan. 1, 28	19,600	62	62¼	60	60	— 2¼
182	123¾	187½	176½	20,000,000	100	Illinois Pipe Line	$6S.A.	Dec. 15, 27	1,900	180	187½	178	183	+ 3
64¾	37¾	65¼	58⅜	(sh) 6,458,267	N.P.	Imperial of Canada	‡25cQ	Dec. 1, 27	2,900	59¾	59¾	58⅛	58⅛	— 1⅝
94½	61	78¾	75	$5,000,000	$ 50	Indiana Pipe Line	†$1Q	Feb. 15, 28	500	75⅞	76¼	75½	76¼	— ⅜
39	28⅛	43	35¼	(sh)17,123,444	N.P	International Petroleum	25c	Nov. 15, 27	20,600	37¼	37½	35¼	35¼	— 1⅜
24	13¼	23	20½	$6,363,350	12.50	National Transit Co	25cQ	Dec. 15, 27	8,600	23	24	22¾	22¾	— ½
44⅜	31¾	48⅞	37½	5,000,000	100	New York Transit	.....	July 15, 26	550	48¼	48¼	47½	47½	— 1⅜
100	70	105	94	4,000,000	100	Northern Pipe Line	‡$3S.A.	Jan. 1, 28	550	101	105	101	104½	+ 3½
67⅞	52	66¾	59¾	60.000.000	25	Ohio Oil Co	‡50cQ	Dec. 15, 27	4,300	60½	60½	59¾	59¾	— ⅝
39	12	39⅞	33⅛	10.000.000	25	Penn Mex. Fuel	.....	May 21, 25	1,300	38½	38¾	33⅛	33⅛	— 5⅝
55⅛	45⅝	50½	48⅜	60,000,000	25	Prairie Oil & Gas	.....	Aug. 31, 27	5,200	49¼	49½	48⅜	49	+ ⅝
190	132	211½	184	81,000,000	100	Prairie Pipe Line	$2.50Q	Feb. 1, 28	4,500	187½	211½	187½	208	+20½
201⅜	175½	178	175	4,000,000	100	Solar Refining	$5S.A.	Dec. 20, 27	40	178	178	176	176	+ 2
27¼	15⅜	33½	21	5,000,000	50	Southern Pipe Line	$2	Dec. 1, 27	500	26¾	27½	26¾	27	+ ¼
41⅜	35	40¼	36¾	20,00.000	25	South Penn Oil	50cQ	Dec. 31, 27	700	37½	37¾	37¼	37¼	— ⅜
83	55⅛	90¾	70	3,500.000	100	South West Pa. Pipe Lines	‡$1Q	Dec. 31, 27	350	87½	90¾	87½	90¾	+ 1½
81⅛	64⅝	80½	71¾	228.415.463	25	S. O. Indiana	‡62½cQ	Dec. 15, 27	13,300	74⅝	76⅛	71¾	71¾	— 4½
20⅞	14⅜	17½	15	8,000,000	25	S. O. Kansas	.....	June 16, 24	700	15⅜	15⅝	15¼	15⅛	— ⅛
130	111½	132¾	122¼	17,012.559	25	S. O. Kentucky	$1Q	Dec. 31, 27	1,500	126	126¾	122¼	123	— 3½
49½	40	43	41½	4,559,850	25	S. O. Nebraska	62cQ	Dec. 20, 27	300	42	42	41½	41½	— ⅛
87½	72	79	74	14,000.000	25	S. O. Ohio	62½cQ	Jan. 2, 28	100	74½	74½	74½	74½	— ¼
122	117¼	120¾	117	7,000,000	100	do pfd	$1.75Q	Dec. 1, 27	10	117	117	117	117	+ ¼
21	14½	26	17	30,734,000	25	Swan Finch Co	.....	Nov. 1, 19	150	17	17	17	17	0
149¾	95¼	148½	138⅜	62,470,800	25	Vacuum Oil	‡50cQ	Dec. 20, 27	25,800	143⅜	143½	138⅛	138⅛	— 4⅛

*New high †New low xEx dividend ‡Also extras.

Independent Oils on New York Curb

1927 High	1927 Low	1928 High	1928 Low	Par Value	Stocks	Transactions Week Ended Feb. 18 Sales	First	High	Low	Last	Change
2⅛	.55	1⅛	.80	$ 5	Amer. Con. Oilfields	19,800	.84	1⅛	.80	.90	+ .03
7½	2¾	4⅞	3¼	N.P.	Amer. Maracaibo	2,200	3½	3⅝	3¼	3¼	— ¼
2⅜	1	4	2½	$ 10	Argo Oil	100	2⅝	2⅝	2⅝	2⅝	— ⅛
9¼	6¾	9⅞	8	10	Arkansas Nat. Gas	2,200	8½	8½	8	8	— ½
20½	15½	.....	.....	N.P.	Beacon Oil	.....	.....	.....	.....	.....	.....
40	20½	39¾	38	N.P.	British American	.....	.....	.....	.....	.....	.....
28¼	15½	23⅞	18½	25c	Carib Syndicate(new)	4,100	21⅛	21⅛	20	20⅜	— ½
26	15⅛	.....	.....	.....	do ctfs. of deposit	.....	.....	.....	.....	.....	.....
58¾	40¼	56	54	$ 20	Cities Service	23,000	55⅛	55¾	55	55⅛	— ¼
95⅝	87	95½	94½	100	do pfd	700	95⅛	95½	95	95¼	— ¼
8⅞	7⅜	9⅛	8⅞	10	do pfd. B	700	9	9⅛	8⅞	9⅛	+ 1/16
29¼	22½	.....	.....	10	do banker's shares	.....	.....	.....	.....	.....	.....
3⅞	1⅜	1⅜	1⅛	1	Colombia Syndicate	4,500	1½	1½	1⅛	1⅛	— 1/16
9¾	6⅜	7¼	7	10	Consolidated Royal	100	7¼	7¼	7¼	7¼	0
14⅞	9½	12⅜	10	N.P.	Creole Syndicate	27,000	10⅞	12⅜	10⅞	12	+ 1
3	.50	1½	.80	N.P.	Crown Central	300	99	99	87	87	—12
12	4	11	8⅛	N.P.	Darby Petroleum	400	10	10	9¾	9¾	— ¼
11⅛	4	10⅞	7⅞	.....	do trust ctfs	300	9	9	9	9	— 1⅞
2½	.74	1⅞	1	N.P.	Derby Oil & Refining	.....	.....	.....	.....	.....	.....
16¾	4	.....	.....	N.P.	do pfd	.....	.....	.....	.....	.....	.....
3¾	1	2	1⅜	N.P.	Gibson Oil	1,700	1⅜	1⅜	1⅜	1⅜	0
2	.40	.53	.51	N.P.	Gilliland ctfs	.....	.....	.....	.....	.....	.....
118	86¼	117¼	101½	$ 25	Gulf Oil Corp	4.000	103¾	105	102	103	0
2⅛	.80	2½	1½	10	Intercontinent Pet	14,900	2	2½	2	2⅜	+ ⅜
2¼	1⅛	1⅞	1¼	N.P.	Kirby Petroleum	.....	.....	.....	.....	.....	.....
10⅞	5⅛	6⅜	5⅜	N.P.	Leonard Oil & Dev.	3,600	5½	6	5⅜	5½	— ½
27½	20	23	21	N.P.	Lion Oil & Refg	400	21⅞	21⅞	21	21½	— ⅜
59⅜	37	55⅞	52½	$ 25	Lone Star Gas	500	53	53¾	53	53	— 1½
2⅞	.80	1⅜	1⅜	1	Magdalena Synd	6,600	1⅜	1⅜	1⅜	1¼	0
21½	20⅞	22¼	22¼	N.P.	Manhattan Oil	.....	.....	.....	.....	.....	.....
52	12	45	40½	N.P.	Margay Oil	100	40½	40½	40½	40½	0
3	1½	.....	.....	$ 10	Mexican-Panuco	.....	.....	.....	.....	.....	.....
12⅛	5	6⅜	5⅛	N.P.	Mexico-Ohio Oil	.....	.....	.....	.....	.....	.....
1½	1	1⅜	1¼	$ 1	Mountain & Gulf	.....	.....	.....	.....	.....	.....
29¼	22¾	28⅝	25¼	10	Mountain Producers	9.000	26½	26⅝	25¼	25¼	— 1⅜
5⅞	4⅜	5⅜	4⅞	5	New Bradford	1,100	5	5	4⅞	4⅞	— ⅛
6¼	4	4⅜	4⅜	10	New England Fuel	200	4⅜	4⅜	4⅜	4⅜	— ⅜
16	9¼	9⅞	8½	1	New Mex. & Ariz	100	8½	8½	8½	8½	0
13⅞	9	14¼	11½	25	New York Oil	1,800	12¾	13	12¾	13	+ ⅛
12¾	9½	12⅛	10¾	N.P.	North Cent. Texas	200	12	12	12	12	+ ⅛
23⅞	21¼	.....	.....	.....	Okla. Nat. Gas ctfs.	.....	.....	.....	.....	.....	.....
9¼	3¼	6	4⅛	N.P.	Pandem	10,600	4⅞	5	4⅛	4½	— ⅜
12⅛	7	10⅞	8¾	N.P.	Panapec Oil	800	9⅜	9⅝	9½	9½	0
9	7⅜	11⅜	10⅝	$ 25	Paragon Refg	.....	.....	.....	.....	.....	.....
.37	.25	.....	.....	N.P.	Peer Oil Corp	.....	.....	.....	.....	.....	.....
13½	5⅛	6⅜	5½	$ 10	Pennok Oil	900	5⅜	5⅜	5⅛	5⅛	— ¼
.....	.....	4⅛	3⅜	5	Pittsburgh Oil & Gas	.....	.....	.....	.....	.....	.....
24¾	7	12	12	25	Red Bank Oil	.....	.....	.....	.....	.....	.....
15½	3½	5½	4½	N.P.	Reiter-Foster	900	4⅝	4⅝	4⅛	4⅛	— ⅜
28⅝	15	25½	23¼	$ 25	Richfield Oil	100	23¼	23¼	23¼	23¼	— ¾
7	4½	5⅝	4⅞	N.P.	Ryan Consolidated	.....	.....	.....	.....	.....	.....
8	5¼	7¼	6¾	$ 10	Salt Creek Cons	1,800	7	7	6¾	6¾	— ⅜
35⅛	27¼	35	28½	10	Salt Creek Prod	5,400	31¼	31¼	28½	28⅞	— 2⅛
7	1¼	2	1	5	Savoy Oil	300	1½	1½	1	1	— ⅛
26½	17	20	13	10	Tidal Osage	2,200	16	16	13	13½	— 1½
23¾	15	18	13½	10	do non-voting	1,500	15	15	13⅛	13⅛	— 1⅞
92	63½	86	84⅝	100	Transcontinental pfd	100	85⅛	85⅛	85⅛	85⅛	0
23¼	7	27¾	18	10	Venezuela-Mexico	400	25	26½	25	26½	— 1
7⅜	4⅛	6¼	4⅛	5	Venezuelan Petrol	2,600	5⅜	5⅜	4⅞	5	0
32⅜	19½	22⅞	21	N.P.	Wilcox Oil & Gas	200	21⅞	21⅞	21⅛	21⅛	+ ⅛
8	4¾	7	6	$ 1	Woodley Petroleum	600	6	6	6	6	0
6	1¾	2¾	2¼	25	Y Oil & Gas (new)	.....	.....	.....	.....	.....	.....

*New High †New Low xEx Dividend

New York Curb Bonds

Week Ending Feb. 17

	High	Low	Last	Ch'ge
Beacon Oil 6s '36	102½	101⅛	101⅛	—1⅜
Cities Serv. 5s '66	92⅝	92⅛	92½	+ ¼
Cities Serv. 6s '66	103¼	103	103	— ⅛
Cities Serv. G5½s' 42	94¾	94⅝	94¾	0
Empire Oil 5½s '42	94	93⅝	93⅞	— ⅛
Gulf Oil 5s '37	102	102	102	— ⅛
Gulf Oil 5s '47	101⅞	101⅜	101⅜	— ⅛
Independent Oil 6s '39	99⅛	98½	98¾	— ¼
Phillips Pet. 5¼s '39	93	91¾	92¼	—1
Richfield Oil 6s '41	98¾	98¼	98¾	+ ¼
S. O. N. Y. 6½s '33	103¼	103¼	103¼	0
Sun Oil 5½s '39	102⅛	102	102	0
Trans. Con't Oil 7s '30	108	104	104¼	—4¼
Valvoline 7s '37	104¼	104¼	104¼	— ¼
Warner Quinlan 6s '42	99¾	99	99	— ½

New York Bonds

Week Ending Feb. 17

	High	Low	Last	Ch'ge
Amer. Reb. deb. 6s	102⅞	102	102⅞	+ ⅜
Assoc. Oil gold 6s	103¼	102¾	102¾	— ½
Atlantic Refg. deb. 5s	101⅞	101¼	101⅞	— ⅜
Barnsdall Corp. 6s	100¼	99½	99½	—1¼
Barnsdall Corp. 8s ex-war.	91¾	91½	91¾	+ ⅛
Cal. Pet. 5s	100½	100⅛	100⅛	0
Cal. Pet. 5½s	102½	102	102	— ¼
General Petroleum 5s	102½	102	102¼	— ¼
Humble Oil & Refg. 5½s	103⅛	102⅝	102⅝	— ⅜
Humble Oil & Refg. 5s	100⅞	100⅛	100½	0
Mid-Cont. Pet. 6½s	105½	105⅛	105½	+ ⅜
Pan Amer. P & T 7s	105½	105⅜	105⅜	+ ⅛
Pan Amer. P & T 6s	103¼	103	103	— ¼
Pan Amer. P & T 6s	93½	93	93	0
Simms Pet. cvt. 6s	103	101¼	101¼	—2⅛
Sinclair Con. Oil 7s	101	100½	100½	— ½
Sinclair Con. Oil 6½s	97⅞	97	97	— ⅜
Sinclair Con Oil 6s D	98⅝	98⅜	98⅜	— ⅛
Sinclair Crude Oil 5½s	98¾	98¼	98½	+ ⅛
Sinclair Pipeline 5s	95½	95	95⅛	— ⅜
Skelly Oil 5½s	94⅞	94⅜	94⅞	+ ⅛
S. O. N. Y. 4½s	97⅝	97¼	97⅜	— ⅛
S. O. N. J. deb. 5s	103¾	103¾	103¾	0
Union Oil of Calif. 6s A	111	110¾	110¾	—1¼
Union Oil of Calif 1st 5s A	102	102	102	+ ⅛
Union Oil of Calif. 5s C	100¼	99¾	99¾	— ¼
White Eagle 5½s	94¾	94	94⅛	— ⅛

Petroleum Index Number Continues to Fall

WASHINGTON, Feb. 20.—Wholesale prices in January averaged slightly lower than in December according to information collected in representative markets by the Bureau of Labor Statistics of the U. S. Department of Labor. The bureau's weighted index number, computed on prices in the year 1926 as the base and including 550 commodities or price series, stands at 96.3 for January, compared with 96.8 for December, a decrease of ½ of 1 per cent. Compared with January, 1927, with an index number of 96.6, a decrease of 1/3 of 1 per cent is shown. Index number of all petroleum products was 65.6 compared with 66.2 in December and 93.0 in January, 1927.

Farm products as a group advanced over 1½ per cent above the December level, due to price increases for grains, cattle, poultry, tobacco, onions, potatoes, and wool. Hogs, lambs, and cotton, on the other hand, were cheaper than in December.

Foods as a whole declined over 2 per cent, due mainly to price decreases in dairy products and meats. Hides and leather products again advanced sharply, while building materials showed a minor increase. In all other groups of commodities, except miscellaneous, decreases were recorded, ranging from less than ½ of 1 per cent in the case of metals and metal products and housefurnishing goods to 2 per cent in the case of fuel and lighting. No change in the price level is shown for the group of miscellaneous commodities.

Of the 550 commodities or price series for which comparable information for December and January was collected, increases were shown in 166 instances and decreases in 135 instances. In 249 instances no change in price was reported.

British Imports Lower

CLEVELAND, Feb. 20.—Commerce Reports, published by the Department of Commerce, on petroleum conditions in Great Britain says, "Imports of petroleum, especially in crude and fuel oils, is at a reduced rate. Oil freight rates are much lower, owing to the increased tanker tonnage launched during recent months. Hearings continued during January on the proposed new by-laws to permit gasoline tankers to proceed up the Thames beyond the present limit."

Correction

Quotations in Skelly Oil Co. stock in NATIONAL PETROLEUM NEWS for Jan. 18 should have been: first sale 27⅛; high 28¼; low 26¾; last 27¾; change ⅝. Sales for week totaled 41,600.

THE OIL INDUSTRY EXCHANGE

Positions Wanted

CHEMIST DESIRES POSITION lubricating department or laboratory. Several years experience assistant chief chemist and in direct charge lubricating department large refinery. Technical education. Address Box 34.

REFINERY SUPERINTENDENT eighteen years construction and operation. Thoroughly acquainted with modern equipment and assembling meritorious organization. Address Box 994.

REFINERY SUPERINTENDENT, college education and exceptional experience with cracking equipment, wishes connection with some company in supervisory or engineering capacity. References furnished. Address Box 25.

DISTRIBUTION EXECUTIVE—Fifteen years practical experience in supervision of operation of tank trucks and service stations for two large Mid-Continent refiners and wide sales experience. Will consider moderate salary, any location, provided connection offers advancement by results obtained. Address Box 32.

I HAVE had seven years experience as an independent jobber of lubricating oil, greases and fuel oils and will entertain proposition for position from reliable concern.

Address Box 36

Situations Open

DRAFTSMAN WANTED

First-class draftsman who understands modern refining equipment wanted by oil refining company in the southwest. Please give full details as to age, experience, etc.

Address Box 23.

SALESMEN WANTED

We have some open territory for live salesmen who know the filling station and garage field. State experience, territory you are now covering and what lines you represent. Address Dayton Air Compressor Co., 425 Valley St., Dayton, Ohio.

CONSTRUCTION ENGINEER

experienced on pipe still construction and operation for European service of approximately one (1) years' duration. Must speak French or German. Give complete information in reply. Box 33.

Advertisers having box numbers should be addressed in care of National Petroleum News, 1213 W. 3rd St., Cleveland, Ohio, unless otherwise specified.

Wanted to Buy

WANTED—Used truck with compartment tank. John A. Anderson, 612 North Michigan Avenue. Chicago, Illinois.

For Sale

FOR SALE: Whole or part interest in live tank wagon and filling station business in Massachusetts with bulk station, chain of filling stations, tank trucks and complete equipment. Address Box 35.

Economy in Production

Do you realize how many hundreds of thousands of dollars are lost annually by accumulation of used engines, drilling equipment, etc., in refineries, warehouses or on leases?

Don't let your money be tied up in anything you don't need. Look over the equipment you are not using and write us about it. We'll sell it to some of our 15,000 readers.

Miscellaneous

WHAT IT COSTS

"For Sale," "Wanted to Buy," "Help Wanted," "Business Opportunities," "Miscellaneous" classifications, set in type this size without border—10 cents a word. Minimum charge, $3.00.

"Positions Wanted"—5 cents a word. Minimum charge $1.00.

Advertisements set in special type or with border—$4.00 per column inch.

Copy must reach us not later than Friday preceding date of issue.

All advertisements carried on this page are payable in advance.

ADVERTISERS INDEX

National Petroleum News

Adamson Mfg. Co.
Air Scale Co.
Allison Coupon Co. 106
Aluminum Company of America
American Can Co.
American Flange & Mfg. Co.
American Hoist Corp.
American Machine & Foundry Co.
American Oil Pump & Tank Co.
American Radiator Co.
American Schaeffer & Budenberg Corp.
American La France & Foamite Corp.
American Steel Package Co. 106
American Telephone and Telegraph Co.
Anderson-Prichard Oil Corp.
Associated Supply Co.

Badger & Sons Company, E. B.
Barnickel & Co., Wm. S. 84
Barnsdall Refineries, Inc.
Bartlett Hayward Co.
Battenfeld Grease & Oil Co.
Bennett Pumps Corp. 14–15
Bessemer Gas Engine Co. 56
Best Stamp & Mfg. Co.
Bethlehem Steel Co. 88
Biggs Boiler Works Co. 63
Binks Spray Equipment Co.
Blackmer Pump Co.
Blaw-Knox Co.
Bolene Refining Co.
Bowser & Co., Inc., S. F.
Braden Steel & Winch Co. 60
Braun & Co., C. F.
Brown Instrument Co.
Brown Sheet Iron & Steel Co. 116
Buckeye Boiler Co.
Buckeye Iron & Brass Works
Buckeye Traction Ditcher Co.
Budd Wheel Co.
Buffalo Meter Co. 89
Butler Mfg. Co.

Campbell, J. A.
Canfield Oil Co., Cleveland 4–5
Carbondale Machine Co.
Celite Products Co.
Central Commercial Co.
Champion Pneumatic Mach. Co. 9
Champlin Refining Co. 97
Chemical Catalog Co.
Chestnut & Smith Corp. Insert
Chevrolet Motor Co.
Chicago Pneumatic Tool Co.
Chicago Tubing & Braiding Co.
Cincinnati Advertising Products Co.
Clark Bros. Co.
Clark Co., Fred G.
Classified Advertising Section 127
Clear Vision Pump Co.
Combustion Engineering Corp.
Continental Ref. Co. 116
Continental Supply Co.
Crown Central Petroleum Corp. Outside Cover
Curtis Pneumatic Machinery Co. 6
Cushing Refg. & Gasoline Co.

Daugherty & Son Rfg. Co., W. H.
Davis Welding & Mfg. Co. Inside Front Cover
Dayton Air Compressors 102
Dayton Pump & Mfg. Co.
Dearborn Chemical Co.
Deepwater Oil Refineries
Diebold Safe and Lock Co.
Doelker Co., J. R.
Draper Mfg. Co. Inside Back Cover
Dunn Manufacturing Co.
Dyestuffs & Chemicals, Inc.

Eaton, J. E.
Edwards Mfg. Co.
Emerson-Scheuring Tank Co.
Empire Oil Works, Inc. 74
Empire Oil & Refining Co.
Erie Meter Systems, Inc. 98–99
Ethyl Gasoline Corp.

Farrell Mfg. Co.
Federal Motor Truck Co.
Fisk Tire Co., The
Fiske Bros. Refg. Co.
Flexlume Corp.
Fogarty Mfg. Co.
Foster-Wheeler Corp. 86
Foxboro Co., Inc. 53
Franklin Creek Refg. Co.
Freedom Oil Works

Frontier Mfg. Co.
Fry Equipment Corp. 110–111

General Ceramics Co.
General Insulating & Mfg. Co.
General Woodwork Corp.
Gilbert & Barker Mfg. Co. Insert
Globe Mfg. Co.
Globe Oil & Refg. Co.
Goodrich Rubber Co. B. F.
Gousha Co., H. M.
Graham Brothers
Graver Corp.
Gray Processes Corp.
Gulf Ref. Co. 62
Gustafson Bros. Oil Co.

Halliburton Oil Well Cementing Co. 59
Hartol Products Corp.
Hayes Equipment Mfg. Co.
Haynes Stellite Co. 13
Heil Co., The 93
Heine Boiler Co.
Highland Body Mfg. Co.
Holmes Co., Ernest 73
Hope Engineering & Supply Co. 47
Hotel Gibson
Hughes Tool Co. 101
Hull Sign & Mfg. Co.
Humble Oil & Refining Co.
Huntley & Huntley

Independent Oil & Gas Co. 16
Indiana Truck Corp.
Insulating Products Co.
International Combustion Eng. Corp.
International Derrick & Equip. Co.
International Harvester Co.

Jenkins Bros. 88

Kanotex Ref. Co.
Kellogg Co., M. W. 102
Kellogg Mfg. Co.

Ladd Water Tube Boiler Co.
Leach Co., C. H.
Lewis-Shepard Co.
Lientz & Co., B. P.
Linde Air Products Co.
Lubricating Appliance Mfg. Co.
Luce Trunk Co. 109
Lummus Co., The Walter E.

Marland Refg. Co.
Mars Company
Martin & Co., F. E.
Martin & Schwartz, Inc.
McDonald Mfg. Co., A. Y.
McKee & Co., Arthur G.
McNally & Co., Rand
Merco Nordstrom Valve Co.
Merit Oil Equipment Co.
Metal Hose & Tubing Co. 104-105
Metric Metal Works
Mid-Continent Petroleum Corp. Insert
Milestone Meter Systems Inc.
Miller Sons Co., A. D. 63
Milwaukee Tank Works 7
Murdock Pump Co.

National Carbon Co., Inc.
National Oil Products Co. 63
National Petroleum News 12–108
National Recording Pump Co.
National Refining Co.
National Steel Barrel Co. 8
National Transit Pump & Machine Co. 50
National Tube Co. 40
Niles Steel Products Co.
North American Car Corp.
Northern Pump Co.

Oakite Products, Inc. 84
Oil Conservation Engineering Co.
Oil Products Appliance Co.
Oil Well Supply Co.
Omar Refining Co.
Oxweld Acetylene Co.

Paige & Jones Chemical Co., Inc.
Parkersburg Rig & Reel Co. 85
Pennsylvania Flexible Metallic Tubing Co.
Pennsylvania Refg. Co.
Petroleum Iron Works Co. 91
Pforzheimer & Co., Carl H.
Phillips Petroleum Co.
Pittsburgh-Des Moines Steel Co.
Pittsburgh Equitable Meter Co.
Pittsburgh Gasoline Pump Co.
Platt Co., W. C. 118
Powerine Co., The
Pressed Steel Tank Co.
Prest-O-Lite Co.
Producers & Refiners Corp.
Professional Card Section
Pure Oil Co.
Pyrene Mfg. Co.

Quincy Compressor Co.

Reading Iron Co. 81
Reid Gas Engine Co., Jos.
Remington Rand Business Service, Inc.
Reo Motor Car Co.
Rhodes Co., Jay B. 11
Roper Corp., Geo. D.
Roxana Petroleum Corp.
Roy Manufacturing Co.

St. Louis Can Co.
St. Louis Steel Package Co.
St. Louis Surfacer & Paint Co.
Safety Lift Co. 62
Sargent Engineering Corp.
Selden Truck Corp.
Service Station Equip. Co.
Seymour-Howard Corp. 109
Shaffer Tool Works
Sharpsville Boiler Works Co.
Shaw, S. F.
Shotwell Pump & Tank Co.
Simms Oil Co. 114
Sinclair Refining Co. 112
Sistersville Tank & Boiler Works
Skelly Oil Co.
Smith Corp., A. O.
Sonneborn Sons, Inc., L.
Southwestern Engineering Corp.
Spears & Riddle Co.
Standard Boiler & Plate Iron Works
Standard Garment Co.
Standard Lift Co.
Standard Liquid Testing Devices, Inc.
Steinke Brothers Mfg. Co., Inc.
Stevens Grease & Oil Co., A. J.
Stoll Oil Refg. Co.
Sun Oil Company 3
Sun Shipbuilding & Dry Dock Co.
Superior Oil Works 79

Tagliabue Mfg. Co., C. J.
Taylor Instrument Companies
Texas Company, The
Texas Pacific Coal & Oil Co. 103
Tidal Refining Co.
Tokheim Oil Tank & Pump Co. 107
Transcontinental Oil Co. 94

Union Metal Mfg. Co.
United Filters Corp. 88
U. S. Air Compressor Co.
United States Cast Iron Pipe & Foundry Co.
Universal Oil Products Co. 69

Vacuum Oil Co.
Viking Pump Co.
Vilter Mfg. Co.
Vogt Machine Co., Henry 10

Wackman Welded Ware Co.
Wadhams Oil Co.
Walworth Co. 1
Warren Refining & Chemical Co.
Waukesha Motor Co. 39
Wayne Co.
Westcott & Greis, Inc. 66
Western Clay & Metal Co.
Wheaton Brass Works, A. W. 33
Wheeling Steel Corp. 2
Widdell Engineering Co., Inc.
Williams Sealing Corp.
Willock Oil Corp. 55

Youngstown Boiler & Tank Co. 55
Youngstown Welding Co., The